The Chemical Age

VOL LXVIII 21 FEBRUARY 1953 No 1754

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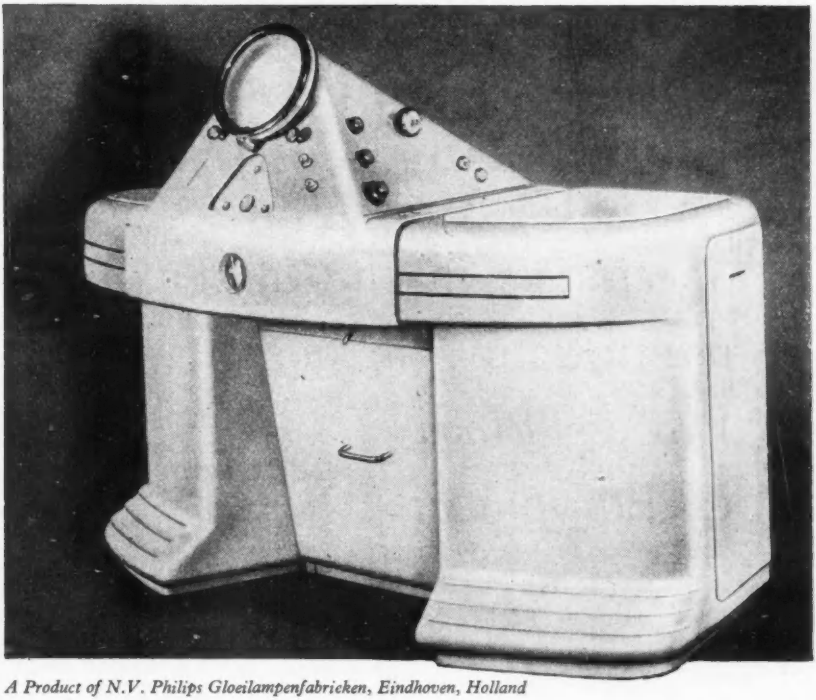

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Fertiliser Recovery?

WITH a long winter still gripping the countryside, it might seem too early yet to assess the fertiliser situation. But there are already encouraging signs that the 1951/52 recession in fertiliser use will not be repeated for 1952/53. Reports from the industry are much more encouraging than at this time last year. Bad weather in February rarely helps advance distribution; nevertheless, some producers quite early this month were unable to accept further orders for prompt delivery. And, if reports from some areas reflect the general position everywhere, the total 1952/53 output of one or two specialised products—notably of the highly concentrated compound fertilisers—has been fully ordered already.

In addition to the encouragement given by the revived subsidies (now, of course, paid directly to farmers and considerably reduced in scale from the old ones), manufacturers have been able to reduce prices for most fertilisers. Although labour costs have risen, bagging costs and the freight charges for imported raw materials have eased, and from the commencement of the current agricultural year these benefits have been passed on to the consumer. Any impression that fertilisers are too dear is psychological rather than logical; no matter what farm crop is taken as an example, the minimum expectable return in extra produce from an appropriate fertiliser dressing greatly exceeds the cost of both fertiliser and its application. Returns of 200 per cent are far from unusual; and even on poor soils requiring exceptional help returns of at least 40 or 50 per cent can be expected. Many small-acreage farmers, however, still seem to be economically timid in their attitude to fertilisers.

It is the view of some agriculturists that shortage of working capital rather than any effects of fertiliser prices per ton, is the dominant deterrent. Even in the United States this same problem is revealing itself, especially in those areas where usage rates have obstinately remained below the rising national level. There education in the benefits of adequate fertiliser use is being aimed not only at farmers but at bank managers as well! In this country a few isolated suggestions that credit assistance might be as important as subsidy help seem to

have fallen upon stony ground. However, most manufacturers here have credit terms for purchase, although the charges have had to be increased with the rise in both price per ton and bank rate, and no farmer of reasonable reliability is without help in this direction.

The severe changes in prices that followed de-subsidisation have probably focused too much attention upon the £. s. d. figures on fertiliser invoices, and in consequence too little has been directed towards the equally important figures that declare the plant-food content. In the past few years there has been a steady movement towards higher analysis, and for buyers this is a valuable aspect of economy. The same transport costs, the same handling and bagging costs, apply to a ton of low-analysis as to a ton of high-analysis material. The steadily increasing introduction of granulation for compound fertilisers (now applied to a much higher proportion of output than in any other country in the world) has enabled British manufacturers to produce compounds in good physical condition without reliance upon bulky fillers. Year by year, the average nutrient content of compounds (the total sum of percentage contents of nitrogen, phosphoric acid, and potash) has been rising. Formulations with relatively low nutrient contents may still be offered for there is still some demand for them; but the tonnage that is sold of these is falling and the tonnage of higher-analysis products is steadily rising. A special and significant development in this direction has occurred during the current agricultural year—the introduction of triple superphosphate. Ordinary superphosphate contains 18.0 per cent (sometimes 19.0 per cent) of soluble phosphoric acid; triple superphosphate offers 47.0 per cent. This not only enables phosphatic dressings to be achieved with smaller amounts of material and with a 50 or 60 per cent saving upon handling costs, but the use of triple superphosphate in compound manufacture enables greater amounts of nitrogen and potash to be provided because less room is needed for incorporating the basic amount of phosphate. In the not too-distant future it may well be found that the triple superphosphate production of a single factory is insufficient to meet national demand. It is no small sign of the present recovery in fertiliser demand that the tonnage of all fertilisers is rising despite the fact that every ton of triple superphosphate is serving the former purpose of 2½ tons of ordinary superphosphate. No country can less afford to make the fullest use of fertilisers than Britain. It is to be hoped that no further checks to expansion will have to be endured.

On Other Pages

The annual subscription to THE CHEMICAL AGE is 42s. Single copies, 1s.; post paid, 1s. 3d. SCOTTISH OFFICE: 116 Hope Street, Glasgow (Central 3954/5). MIDLANDS OFFICE: Daimler House, Paradise Street, Birmingham (Midland 0784/5). LEEDS OFFICE: Martins Bank Chambers, Park Row, Leeds, 1 (Leeds 22601). THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers Limited.

Notes & Comments

Science and Youth

WE have drawn frequent attention to the decline in our schools' capacity to teach science. Whether or not this is a state of affairs that must be tolerated, we do not as a country compare at all favourably with the United States for extra-educational efforts to stimulate youthful interest in science. There, more than a third of a million boys and girls belong to some 15,000 science clubs, a national activity sponsored by Science Service. It is the object of these clubs to foster interest in one or more of the scientific subjects as a hobby, to encourage home experimentation for its own sake. It is claimed—and not unreasonably—that many young people develop scientific aptitude more assuredly this way than through formal classroom routine. What are known as 'science fairs' are annually held; a competitive national science talent 'search' is now in its twelfth year. State institutions of science, colleges, teaching profession associations, professional organisations and the Press all co-operate with Science Service in amplifying the reach and benefits of these clubs. Our own efforts in a similar direction are so small that they can be dismissed as negligible. Occasional essay competitions, spasmodic attempts by scientific societies to give youth an outline of, say, the work of chemists, a few films on technological-commercial topics, these are not only minor approaches but they are largely if not wholly directed towards youth through existing school channels. The vigorous movement in America has two purposes: to find the most promising scientific students, and to create a generally better understanding of science in future generations. It may well be that in the end the second purpose proves the more important. With science teaching in its present state in Britain—and there seems little hope of forseeable improvement—science clubs for youth would reap richer dividends than they do in the United States; the initiation of a parent organisation might well be considered by some of our leading societies and institutions. It is a project that might be usefully publicised by some such body as the Parliamentary and Scientific Committee.

Cortisone as Antidote

A MEDICAL case of some interest for the chemical industry has been reported from Canada. A woman who attempted suicide by swallowing rat poison thereby received about 14 times the minimum lethal dose of yellow phosphorus, and was critically ill for four days. Dramatic improvement in her condition followed the trial use of cortisone; though it should be said that penicillin and blood transfusions had been used in the first stages of the treatment. However, the effect of the cortisone seems to have been particularly important for it quickly dispelled the typical symptoms of acute phosphorus poisoning. It is thought that this is due to its known ability to stimulate some of the liver functions that are impaired when phosphorus damages this organ. Though the worst days of phosphorus poisoning hazards in industry have long since gone, the production of the element as an intermediate material is steadily expanding. This indication that cortisone has antidote activity might well be further investigated in industrial toxicity research.

Trichloroethylene

THE remarkable growth of trichloroethylene as an industrial solvent is dealt with in a recent article (*Chem. Eng., News*, **31**, 3, 234). Since 1939 production in the United States has risen from 36,000,000 lb. to more than 230,000,000 lb. per annum. The expansion is not due to cheapness; carbon tetrachloride is at least 25 per cent lower in price. But trichloroethylene has a low toxicity and is non-inflammable. It has excellent stability, and very high rates of solvent recovery can be achieved; indeed, to quote from C. B. Shepherd's article, 'solvent recovery is the key to

trichloroethylene's present position and future growth.'

Industrial Applications

RATHER surprisingly, one of the earlier industrial uses of this solvent is declining—its use in dry cleaning clothes. Here it has one defect, a tendency to disturb cellulose acetate dyes at warm temperatures, and tetrachloroethylene is now taking its place in general dry cleaning work. On the other hand, two large-scale solvent uses are rapidly rising—the extraction of oils and fats from animal and vegetable materials, and vapour degreasing of metal parts. It is said that the latter use accounts for 90 per cent of the present total consumption of trichloroethylene in America. This has seen a fourfold expansion since 1947. The principle of vapour degreasing is simple enough. The metal part to be cleaned is suspended above the boiling solvent; the hot vapours condense upon the cold metal surfaces, and the oil and grease, together with adherent dirt, are speedily dissolved and carried away by falling into the solvent receptacle. Various systems of vapour degreasing are employed, some including a spray treatment with the warm solvent. In this field trichloroethylene has no rival except tetrachloroethylene, which is used for special degreasing tasks when higher-temperature treatment is needed, e.g., for wax removal. As an active chemical rather than solvent, trichloroethylene has found very limited use though it has some importance as a base for making other chlorinated hydrocarbons. In the United States, the main difficulty experienced in the production of annually rising tonnage of trichloroethylene has been shortage of chlorine. The principal manufacturing process is the obvious one of acetylene and chlorine reaction followed by dechlorination of the tetrachloroethane with lime.

IN THE EDITOR'S POST

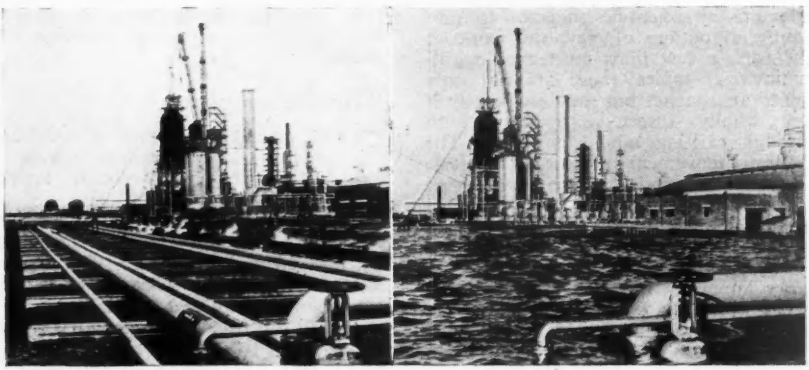
£1,000,000 Wasted

SIR,—If everyone taking a prescription to the chemist's would bring along a clean medicine bottle Britain would save £1,000,000 a year.

At present National Health Service patients lose roughly one-half of the 100,000,000 bottles handed to them each 12 months; and as householder, pharmacist and taxpayer, need I say how much I deplore the loss of the £1,000,000 which this wastage means to all of us?—Yours faithfully,

MARY A. BURR,
Member of the Pharmaceutical Society Council.

Nottingham.



These photographs taken before and after recent flooding along the East coast of England show the main pipe track at the Anglo-Iranian's Isle of Grain refinery and illustrate the immense task now facing the management

Science Research in the Commonwealth

Co-operation at Australian Conference

A PLAN for Commonwealth collaboration in science for the next five years was outlined at the British Commonwealth Scientific Conference held in Australia in February and March 1952, the proceedings of which were published on 10 February, 1953 (HMSO, London, price 3s. net).

The object of the conference was to consider how the fullest co-operation between Government civil scientific organisations in the British Commonwealth could be achieved and to make recommendations for the approval of the governments represented.

Mr. R. G. Menzies, Prime Minister of Australia opened the conference which was attended by 34 senior scientists from the United Kingdom, Canada, Australia, New Zealand, South Africa, Pakistan, Ceylon, Southern Rhodesia, and the Colonies, together with an observer from the U.S.A. Dr. I. Clunies Ross, chairman of the Australian Commonwealth Scientific and Industrial Research Organisation, was elected chairman.

Implementation Satisfactory

Satisfactory implementation of the results of the previous conference held in 1946, was noted. It was agreed that the machinery then set up for facilitating continued collaboration had proved practical and effective and it was decided to retain it in the same form. An association which had proved of great mutual benefit was the arrangement whereby scientific representatives of Commonwealth centres in London and Washington D.C. were associated as autonomous units within British Commonwealth Scientific Offices, and it was agreed to continue this arrangement.

It was considered that the most appropriate method for collaboration in a particular field could as a rule best be settled by study by responsible scientific workers in that field and that this study, especially when it appeared that the establishment of a continuing organisation for promoting Commonwealth collaboration was desirable, could be most conveniently made by the calling together of specialist conferences.

When a laboratory in one country had facilities for carrying out work on behalf of other Commonwealth countries, it was agreed that such an arrangement should be encouraged.

In general, however, the conference did not favour the setting up of internationally administered laboratories and considered that to whatever extent a laboratory functioned on behalf of other countries its administration should remain the responsibility of the country in which it was situated.

Exchange of Information

Effective arrangements for the formal and informal exchange of information on the widest basis and for the easy movement of scientists between Commonwealth countries, for both long and short visits, were considered to be pre-requisites for overseas collaboration of any kind. These matters were dealt with by committees whose reports were discussed and adopted by the full conference.

The Committee on Information Services called special attention to the importance of abstracts to the progress of science and the dissemination of technical information. It expressed alarm at the growing expense of their preparation and publication which might force some valuable abstracting journals to curtail their services or even to suspend publication. The conference accordingly requested the Standing Committee to study the situation in detail and to propose measures to deal with it, not excluding possible joint financial aid by Commonwealth countries.

Reports Discussed

Application of the results of research in agriculture and industry respectively, was considered by committees whose reports were also discussed and adopted by the conference. The agricultural committee concentrated on the need for the improvement of 'Extensive Services.' This term is used to describe staff engaged in advisory work with farmers and in experimental and demonstrational work necessary to get the findings of research applied in practice.

It was agreed that there must be close association between research workers and

agricultural extension officers and that to be effective extensive work should be highly decentralised. Extension officers should be well trained scientists and should be given the opportunity of keeping abreast of new knowledge.

In the case of industry it was generally agreed that large improvements in efficiency could be achieved on the basis of existing scientific knowledge without new research, and that it was a function of the scientific organisations to study how this could be done.

Raising General Output

The value of the study of the actual industrial operations in firms using similar processes and materials, by operational research methods, was stressed as an important means of raising the general output of industry. The importance of the human factor in securing the effective application of science was also noted. The extent to which science could contribute to the solution of human factor problems was a matter of contention, but the conference agreed that operational research would undoubtedly assist.

It was unanimously agreed that there was no substitute for the employment throughout industry, from the board room to the workshop, of people who were able to appreciate the possibilities offered by the adoption of improved methods. So long as this was insufficiently appreciated, progress must be slow. A sufficient number of scientifically trained people did not exist in any of the countries of the Commonwealth today and the best stimulus to improving this unsatisfactory state of affairs lay in an effective demand by industry itself.

Subjects of Importance

Among the subjects judged to be of great economic or scientific importance to the Commonwealth on which special resolutions were passed were; industrial microbiology, the utilisation of low grade ores and the utilisation of solar energy both by physical and biological means.

With scientific research playing an even larger part in the affairs of all nations, it was felt that the effectiveness of the organisation of national research was becoming of increasing importance. Discussing this, the conference agreed that Government organisations must vary in their actual form from country to country, but nevertheless felt that certain general principles, based on experience, could be laid down as a possible guide to nations setting up such bodies for the first time.

For example, the conference considered that the responsibility for their direction should be in the hands of a council, executive committee, or board consisting of senior scientists covering one or more of the fields of industry, agriculture and medicine, with whom representatives of these or other interests might be associated as appropriate. These governing bodies should have a strategic function and recommend broad lines of policy, including the distribution of scientific effort within the organisation and, therefore, the main financial allocations within the total sum of money made available by governments. They should be directly responsible to a Minister, appointed for the purpose by the Government, but should be free from all other political control and influence.

Executive Powers

Once the broad lines of policy had been determined the executive officers of the organisations should have complete responsibility for their general implementation, as should the directors of laboratories for the conduct of the actual research. 'The organisation,' the report continues, 'should have power to appoint to its staff the most suitable men of high scientific ability and promote them as individuals judged in terms of their scientific merit and achievement.'

It was emphasised that a national research organisation could not develop healthily in isolation. The strength of a nation's scientific effort depends primarily on the supply of trained research workers from the universities and the existence of schools of fundamental research which form a country's scientific capital. On the one hand, therefore, national research organisations must be closely associated with universities. On the other hand, in order that their research programmes may be closely related to national needs and results quickly applied, they must work closely with industry, agriculture or medicine.

The first responsibility of a national research organisation should be to survey the problems whose investigation could contribute most effectively to the welfare.

prosperity, or health of the people and thereafter determine research priorities.

Many aspects of the problem of helping the under-developed countries were carefully studied.

It was clear that the advance of medical science by reducing infant mortality and prolonging life in countries short of food and already suffering from population pressure, could have the effect of lowering rather than raising the general standard of living. Similarily, improvements in agriculture could easily be offset by population increase.

This constituted one of the major world problems in which science had a large part, and consequently it was recommended that the Governments of the British Commonwealth should seek joint action with the Food and Agriculture and World Health Organisations of the United Nations to examine the relationship between world food supplies, agricultural systems, rising populations and the influence of medical research in improving nutrition and prolonging life.

The problem of supplying the experts now required for helping under-developed countries through the schemes of United Nations Agencies and the Colombo Plan was considered. It appeared to the conference that many of the scientific specialists now required were of types already scarce in all countries. At the same time the positions under the Technical Assistance Schemes were frequently of short duration and would, therefore, only appeal to scientists if on the termination of their work overseas they could return to normal duties.

Extra Number of Posts

It was accordingly suggested that scientific institutes in the Commonwealth countries should deliberately provide an extra number of posts for specialists in subjects much sought after for overseas work, on the assumption that this would be a continuing demand and that a proportion of their staff would normally be overseas. It was recommended that a thorough study of this problem should be made on a Commonwealth basis.

In the expectation that another conference could usefully be held in 1957 Dr. Clunies Ross was invited to be chairman of the Standing Committee for the next three years after which the chairman would be the representative of the host country for the next conference.

B

Hanbury Medal Awarded

Professor Gösta Edman Recognised

IN recognition of his life work for pharmacy, Professor Gösta Edman, Professor of Botany and Pharmacognosy in the Royal Pharmaceutical Institute, Stockholm, was presented with the gold Hanbury Memorial Medal on 9 February by Mr. W. John Tristram, president of the Pharmaceutical Society of Great Britain. He was, said Mr. Tristram, the first Swedish recipient of the Hanbury Medal, awarded periodically in memory of Daniel Hanbury for 'high excellence in the prosecution or promotion of original research in the natural history and chemistry of drugs.' In view of the extensive use which pharmacognosy makes of the science of botany, Mr. Tristram added, it was particularly appropriate that a compatriot of Carl Linnaeus should receive the award.

Wide Range of Study

Professor Edman's researches had been concerned with a wide range of botanical studies, which had provided data of much value for establishing taxonomic principles as well as making available details of structure, by which adulterants of vegetable drugs might be discovered and identified. Among the subjects studied several communications had described the methods of obtaining the ash content of drugs and also the technique of examining the ash residues microscopically.

Professor Edman had also made general histological studies of certain vegetable drugs, which had been offered commercially in an adulterated condition and he had described the features by which these adulterants could be identified. Chemo-microscopy was another branch of pharmacognosy upon which Professor Edman had made original contributions.

After receiving the Medal, Professor Edman delivered a lecture on 'Ash Pictures in the Identification and Assay of Vegetable Drugs' in the course of which he paid a generous tribute to the work of Dr. T. E. Wallis, who, he said, had, unknown to him, worked out twelve years earlier than he had done the method for making possible a quantitative analysis of mixtures of powdered crude drugs by mixing the sample with known proportions of lycopodium spores.

Animal Parasites

Panel Discusses Chemical Control

IN the rooms of the Chemical Society in Burlington House, on 15 December, Mr. H. E. Harbour, B.A., M.R.C.V.S., of the Cooper Technical Bureau gave a paper entitled 'The Chemical Control of Animal Parasites,' to members of the Crop Protection Panel of the Agriculture Group of the Society of Chemical Industry. The speaker was introduced by Dr. R. A. E. Galley, chairman of the panel.

Of Great Economic Importance

The lecturer reminded his audience that domestic animals and their products form a large part of the crops of the farm and that the control of animal parasites was of great economic importance. He realised that he could only give a very brief survey in the course of one lecture. The principal measures employed against a number of the more important parasites were described and the talk was illustrated by lantern slides.

Sheep scab had been known from earliest times. By surveying the different kinds of measures known to have been used for its control, including the use of BHC dips which had almost eliminated the trouble in Britain, an historical introduction was given to the whole subject.

The use of dips, respectively containing arsenic, DDT, BHC, toxaphene, clordane and dieldrin, against sheep maggot fly were considered and reasons were given for the present preference for DDT. Problems encountered in the use of dips against ticks were considered. The development of resistance strains of ticks might have resulted from the widespread use of insufficiently effective dipping solutions which might have only culled off the non-resistant strains. Closer control was now being kept of the strength of the dipping solutions but the reasons for the high rates of loss of insecticides from dipping solutions were not fully explained.

Mr. Harbour also gave a rapid survey of the use of chemicals against parasitic worms and certain other internal parasites of animals. After drawing attention to cases in which successful control of parasites had been achieved, he concluded by emphasising the need for the combined efforts of different kinds of specialists (biologists, toxicologists, etc.) to overcome many problems in this field.

In opening the discussion, Dr. Galley asked whether repellents had been investigated against parasites such as warble fly. The lecturer replied that the main objection to known repellents was their short effective life under the conditions of use. Dr. R. S. Cahn amplified the lecturer's remarks relating to insecticide resistant ticks, pointing out that in South Africa the wide distribution of resistant strains was almost certainly related to the use of borderline concentrations. In answer to questions from Dr. Galley and Mr. H. K. Smith, the lecturer stated that the risks to animals from ingesting toxic amounts during dipping normally were small; nevertheless there was a risk, particularly with synthetic organic compounds, of absorption through the skin. This risk must be investigated before such compounds were put into full scale use.

In answer to another question Mr. Harbour stated that evidence had recently been obtained which suggested that BHC underwent degradation in dips by bacterial action. Mr. Spence, referring to the lecturer's remarks on warble fly, wondered whether sufficient attention had been paid to the possibilities of control while the larvae were migrating inside the host. As an example, he mentioned that there was a suggestion that phenothiazine had some effect.

Dr. E. E. Turtle, on behalf of the meeting, thanked Mr. Harbour for a most interesting lecture.

Chilean Cellulose Plant

Installation of a cellulose factory with an annual production capacity of 47,500 tons and of a newsprint plant with a capacity of 45,000 tons is being planned in Chile. Both of these factories will be in the Concepción district. The estimated cost is $20,000 already solicited as a loan from the International Bank and 300,000,000 Chilean pesos.

Dutch Soda Industry

According to Amsterdam newspaper reports a large soda factory is to be established at Delfzyl in the northern part of the Netherlands. It is said that it will be erected with American aid and that it will concentrate on exports to the Scandinavian countries.

Universities & Industries Conference

Need for More Post-Graduate Courses

THE need for a change in the approach of schools and universities if they were to provide industry with the right type of graduates was suggested by Sir Ewart Smith, Technical Director of Imperial Chemical Industries, Ltd., when he presented a paper at 'The Universities and Industry' conference held at Ashorne Hill, Leamington Spa, last October. The conference was organised by the Federation of British Industries and the Committee of Vice-Chancellors and Principals of the Universities of the United Kingdom and the full report of the conference has just been published by the FBI in booklet form, price 5s.

Speaking on 'What Qualities Does Industry Require in the University Graduate, and What Is His Rôle in Industry?' Sir Ewart Smith began by saying that it must be remembered that Britain was dependent, as never before on the manufacturing industry for her livelihood and existence. The war and post-war phase of living on capital and on foreign aid was nearing its end, and in addition the terms of trade were inevitably and progressively becoming harder as populations grew and backward countries became industrialised.

The Industrial Revolution was not completed in the 18th and 19th centuries, but was continuing at an accelerating rate. British economy was in danger because of a failure in the past to keep abreast of changes and to take the necessary action.

Efficiency and Progress

Long-term efficiency and progress of any organisation, whether it was an army, an industry, or a manufacturing company, depended primarily on the ability, energy and leadership of its management. In the ultimate analysis, therefore, it was only better management that could secure the advance that was required.

By management was meant 'the organisation and control of human activity directed to specific ends.' It thus covered scientific research, no less than administration or production.

Leadership was, in fact, the main quality which industry required from the men which it recruited, or would like to recruit, from the universities. This included leadership in pure and applied science, as well as in the sphere of administration.

Three Lines of Attack

If such better management was to be achieved, three lines of attack must be followed.

1. Industry must attract a much larger proportion of those who possessed high intellectual ability and/or good qualities of personality. This could only come if there was a better general understanding of the true purpose of industry, of its vital importance to the nation and of the interest and satisfaction which it could offer to all who serve it in a managerial capacity.

2. Such potential leaders of industry must be educated up to and including university level. That is, the educational system must be continuously expanded and improved to meet changing conditions and needs.

3. Industry must provide the continued training, the experience, and the opportunity to carry responsibility which alone could develop the full potentiality of the recruits which it receives. As a corollary, industry must be ready to analyse its problems, apply promptly new methods of production or new techniques of management.

A feeling still persisted in some circles that industry was in some ways a lower calling than that of the arts and the older professions. As a result, many boys, during their formative years, were not led to consider careers in industry; even when they specialised in one of the sciences, they were often drawn to the idea of pure research and the production of knowledge, rather than its application.

There could be no doubt that this lack of understanding and of balance was one cause of Britain's present serious economic position.

'Education,' Herbert Spencer had said, 'has for its object the formation of character,' and industry needed men who had been trained to think, to understand, to be critical and to have initiative rather than those who had been crammed with knowledge which, in many cases, must soon be out of

date. Industry looked to the universities for men who had some understanding of the wider aspects of life than could be gathered from the mental discipline of their own particular subject.

With the accelerating flood of scientific knowledge, there was a growing tendency towards earlier and greater specialisation. Industry, it was true, demanded specialists, but it was also true that industry and the nation could not be run effectively unless their leaders had the breadth of vision which could only come from a good general, rather than a highly specialised education, up to graduate level.

Knowledge of Fundamentals

Surely the right procedure was to inculcate at school, and during the undergraduate stage, knowledge of fundamentals by the experimental and deductive method, combined with an appreciation of historical development, but to defer highly specialised and detailed instruction to post-graduate courses.

If the universities were to turn out men for industry on these lines, it was clear that such recruits on entering the industrial field, would have to be regarded, and recognise themselves, not as a finished product, but as the raw material from which the future senior management of industry might be developed.

This meant that industry would have to recognise and discharge its responsibility for providing the further education and training which was necessary and for doing everything in its power to ensure that the potential of each individual was developed as fully as possible, and was used in the most appropriate way.

Whatever a man's background, the best results could only be obtained if promotion was based solely on merit; on what a man could do now and what he might become in the future, and not primarily on his academic or professional qualifications.

If the universities would give wider recognition to the teaching of administrative studies, this would be of major help in improving the quality of future management.

In the discussion which followed Sir Handley Page said that industry's first task was to persuade the universities to educate men in the way that was going to help them in after-life.

Industrialists, in the view of F. G. W. King (the Dunlop Rubber Co., Ltd.), were asking universities for the impossible. They insisted on specialisation while at the same time expecting graduates to have had a broad training and the opportunities to acquire the qualities essential to a first-rate administrator.

In reply Sir Ewart Smith said that specialisation was necessary, but not for everybody. As he had already suggested the time for specialisation was post-graduate, and in many cases after the graduate had taken up his job in industry.

Referring to applied science and the shortage of ability, Professor J. A. L. Matheson (University of Manchester) agreed with Sir Ewart Smith that it was possible to educate oneself by studying the technologies as well as the arts. Engineering departments of universities were not getting their share of first class brains. A survey made at Manchester University two years ago of students in the science departments, had shown quite clearly that the best boys were going into physics and chemistry.

S. R. Dennison (University of Cambridge), suggested that the real problem was the shortage of first class ability in relation to all the demands for it. In spite of the expansion of the universities, there had been almost no increase in the number of men who obtained first class honours degrees.

Industrialists, replied Sir Ewart Smith, did not think that all university graduates should be first class honours men. With a small nucleus of first rate leaders, a great deal could be got out of the good average man.

A Post-Graduate Course

Following a paper by Dr. Eric Ashby (vice-chancellor, The Queen's University, Belfast) on 'Can the Universities, consistently with their obligations, Turn out Men with the Qualities Required by Industry?' Professor T. U. Matthew (University of Birmingham), said that he had for some years been developing a post-graduate course. Three years ago, at the first Universities and Industry Conference, a plea had been made for post-graduate courses in technology, in response to which four or five such courses had been established at different universities. Industry had not appreciated the full extent of their response, and had failed to support the courses.

Applying Science to Industry

The Duke of Edinburgh on Acceptance of New Ideas

DIFFICULTIES which had to be overcome in trying to apply scientific discoveries to industry to the best advantage were referred to by the Duke of Edinburgh when he attended the annual luncheon of the Parliamentary and Scientific Committee held in London on 11 February.

Science in Britain, the Duke suggested, had three major difficulties with which to contend: encouragement of new discoveries, the application of scientific knowledge within industry for the benefit of the people, and the training of men and women to carry out the tasks.

New discovery and training were largely a question of money, but other complications arose in the application of new knowledge to industry. More progress might be achieved if some confusions could be removed.

The problem of applying scientific knowledge was divided basically into three parts. First, by the improvement of existing processes of manufacture without changing the product, but improving the processes and avoiding waste and inefficiency. Second, by adopting an approach in human relations that allowed the introduction of new processes without disrupting the labour force. Finally, the acceptance of radically new ideas.

If those in industry could be convinced that science could increase production and reduce costs, without loss of quality or upset in the labour force, the Duke said he believed that the problem of applying new ideas would be far easier.

Absence of President

Apologising for the absence of the newly-elected president of the committee, Lord Waverley (who is in Canada), Lord Samuel, the immediate past president, said that the increase in the State grant to universities from £2,000,000 to more than £20,000,000 in the last 10 years was mainly due to the efforts of Lord Waverley. That great sum was a national investment of the most profitable kind; it was an investment in brains, and such an investment yielded the longest return.

Lord Samuel went on to explain how the Parliamentary and Scientific Committee, founded by members of the House of Commons shortly before the last war, now included in its membership more than a quarter of those elected to that House, a smaller but active contingent of representatives from the House of Lords, and delegates of more than 70 institutions connected with the applied sciences.

The widespread interests and activities of the Parliamentary and Scientific Committee and its benefit to science and industry are summarised in its annual report for 1952.

Discussions and Addresses

Among the interesting addresses and discussions at meetings of the general committee were: A talk on 'Government organisations concerned with research and technology,' by Lord Woolton, Lord President of the Council in February; 'Anglo-American Scientific Relations,' by Dr. James Conant, president of Harvard University, U.S.A., in March; and a discussion on 'Human Factors in Industry' in April. Facts and figures about the shortage of science teachers, its consequences, and possible remedies were discussed in June, principal speakers being Dr. A. W. Barton, headmaster, City of London School, Professor W. E. Curtis, F.R.S., professor of physics, King's College, University of Durham and Mr. G. N. Flemming, C.B., Deputy Secretary, Ministry of Education. Addresses on various aspects of 'Management and the Better Use of Science and Technology,' were given in November by Sir Ewart Smith (I.C.I., Ltd.) and others.

In the ballot for private members' motions on 5 December, Mr. Austin Albu, M.P., joint honorary secretary of the Parliamentary and Scientific Committee, drew third place and tabled the following motion:—

'That this House, recognising that if the United Kingdom is to restore its balance of payments and maintain its leading position and influence in the competitive post-war world, and is to carry out effectively its plan for physical reconstruction, social betterment, and re-armament, there will have to be a great expansion of exports, particularly of those goods, which require for their

design and manufacture a high degree of research, technological development and scientific organisation of production; an extension of agricultural production and the development of raw material production within the Sterling Commonwealth together with a more rapid development of the use of home-produced synthetic, in place of imported, raw materials; as well as continued attention to efficiency in all fields of production, both agricultural and industrial at home and in the Colonies, hereby urges Her Majesty's Government to take all possible steps to accelerate the more intensive application of the results of research and scientific discovery; and for that purpose recommends that particular attention should be paid to the importance of ensuring:—

(1) adequate and long-term arrangements for financing industrial and agricultural research, whether by individual firms, research associations, Government establishments or other means and all consequential action necessary to ensure the fullest appreciation and application of the results of that research;

(2) the use of the capital investment programme to encourage more rapid and effective application of the results of scientific research in the agricultural, industrial and Colonial fields; with adjustments of taxation to assist small businesses engaged on work of scientific development;

(3) the provision of the best possible scientific advice at high levels in connection with all policy decisions relating to capital investment, industrial re-organisation and controls concerned with the use of manpower and materials;

(4) an increase both absolute and relative in the number of scientists and technologists in all industries and accordingly the most rapid possible expansion of the facilities for their education in the universities, technical colleges and other educational establishments by the provision of sufficient money and materials and by steps to improve the supply of science teachers for the schools.

The first two motions on the day in question occupied all the available debating time, and Mr. Albu had no opportunity to do more than propose the adoption of his motion. It was, however, the subject of the main leading article in *The Observer* of 4 January.

Further meetings of the Colonial sub-committee were held during 1952. In a report summarising some of the more important points arising from evidence received it was stated that:—

Progress towards the better application of science and technology in Colonial territories depends primarily on opportunities for elementary education being widely extended.

It appears unquestionable that the successful development of the Colonial Empire depends chiefly on the more efficient application of modern scientific knowledge and methods in such fields as agriculture, forestry, medicine or veterinary science and in other activities connected with the development of natural resources. But such efficient application depends in its turn very largely upon the technical competence of the indigenous populations and their ability to take an active part in the process.

Serious note was taken by the committee during the year of the difficulties confronting those responsible for the publication of British Chemical Abstracts. Several references were made to this subject in the House of Lords debate, 11 and 12 June, and the subject was again mentioned to the Lord President of the Council by the deputation which waited on him on 28 July. The matter was the subject to continuing representations at the end of the calendar year.

Cheaper Butyl Alcohol

A REDUCTION in the price of normal butyl alcohol came into effect on 16 February. A. Boake, Roberts & Co., Ltd., announced new rates for its butyl alcohol to B.S. 508: 1950, and a revised schedule for its *n*-butyl alcohol was also announced by British Industrial Solvents Ltd.

The new prices (per ton) are as follows:—

10 tons spot or contract	£161 10s.
1 ton spot or contract	£165 10s.
Minimum 40 or 45 gallon drum lots	£166 10s.

Drums charged extra, but returnable at sellers' expense.

10 gallon can lots	£191 10s.
5 gallon can lots	£201 10s.

Packages included.

All outstanding orders and contracts will be amended accordingly. Bulk quantity allowances remain unchanged.

Petroleum Refining & Chemical Plant

British Firm's World-wide Projects

CLOSELY associated with British progress in the petroleum refining and chemical industries is Foster Wheeler, Ltd., of London and Egham, Surrey, which specialises in the design, fabrication and erection of plant and equipment for a wide range of industrial needs. Such has been the demand for this company's services that since the end of the war the staff of the London office alone has grown from about 150 to over 770. Though entirely British, the firm is part of a world-wide organisation whose parent company is the Foster Wheeler Corporation with its head office in New York. There are also French and Canadian companies, as well as agents and licensees in South America, Australia, South Africa, various European countries, etc.

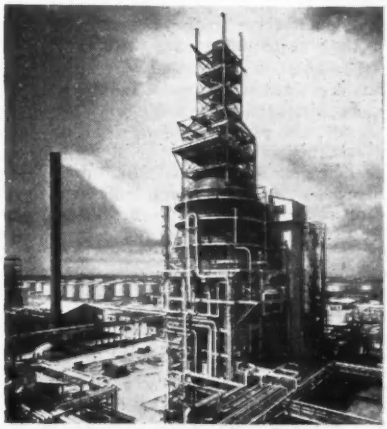
The Foster Wheeler organisation has had over 50 years' experience in designing and building plant for steam generation, petroleum refining, chemical processes, marine boilers, and industrial plant. Modern steaming units include five essentials—the furnace, the firing equipment, the boiler heating surface, the steam superheater, and the heat recovery apparatus. Foster Wheeler pioneered the application of water backs, waterwalls and complete water-cooled furnaces, and has been engaged in this work for more than 25 years.

Production of Superheaters

Over 40 years ago it specialised in the production of superheaters and was one of two pioneers in the United States. It developed the extended surface, cast iron, armoured superheater, the radiant superheater, and separately fired superheaters. With the increase in boiler pressure and temperature, heat recovery devices became essential to maintain efficiency, and the extended surface, cast-iron covered economiser was developed. This is still by far the leading construction for this purpose, but where light weight is essential the extended surface is composed of aluminium rings. Foster Wheeler experience with air preheaters also goes back for about the same period. The first were tubular preheaters used to increase air temperatures to 350°F., plate type heaters being introduced about 1918. Nowadays air is frequently heated to temperatures reaching 550°F. for use with wet fuels.

Thorough knowledge in the design and manufacture of cooling towers has been gained over a period of 50 years. Control of air flow, independent of wind velocity, maintains full production of a plant throughout the year and is therefore amply justified. It is claimed that the mechanically induced draught counter-flow tower offers the most satisfactory balance between maximum performance, low initial investment, and minimum operating costs. The towers supplied are made of California redwood (or an alternative timber suitably treated) and are fitted with light weight axial flow fans, which were developed and tested in the wind tunnel of the Foster Wheeler research laboratory.

For heating processes where the steam temperature at ordinary boiler pressure is insufficient, Foster Wheeler supply Dowtherm vaporisers, which take the form of special water tube boilers, but contain a chemical—Dowtherm 'A'—produced by the Dow Chemical Company. This chemical does not boil until it reaches 500°F. at atmospheric pressure, a vapour temperature of 700°F. being obtained with standard equipment at a pressure of only 88 lb. p.s.i. The system is simple and inexpensive and



Completed catalytic cracking unit at Shell's Stanlow refinery

the temperature may be controlled with remarkable ease and accuracy.

In 1921, after several years of development, Foster Wheeler produced the first commercially successful high pressure cracking furnace. The capacity was 10,000,000 B.Th.U. per hour and the outlet temperature 750°F. Consistent progress in the art of refining has since been made and today furnaces 15 times as large are in operation. Since the war the organisation has supplied 700 complete units to the petroleum refining and petrochemical industries.

All this experience is at the disposal of the British company, which has very large resources of its own. During a life of approximately 30 years Foster Wheeler, Ltd., have also made significant contributions to technological progress in many fields. In its works at Egham, Surrey, many important items of equipment of a highly specialised nature have been manufactured.

Detailed Engineering Analysis

All contracts received by the company, whether for complete plants or for single items of equipment, are given detailed engineering analysis to ensure a design which will satisfy the precise engineering requirements of the installation. Starting from the customer's basic requirements, the problem is studied and the most suitable process is chosen. Long experience of the process data required is usually available within the organisation, but in certain cases the information is obtained either by laboratory and pilot plant experiments or from consultants specialising in the process selected.

The plant is designed by a team of process engineers, who prepare the material and energy balances, engineering flow sheets, and so on, and provide the information from which the various items of equipment can be designed by chemical and mechanical engineers. At its London office the company employs about 220 draughtsmen, who are divided into a number of sections each under the supervision of its leader. One section deals with lay-out, another with foundations, others again with stress-analysis, piping, pressure vessels, heat exchangers, and so forth.

Drawings for each contract or part of a contract are controlled by a co-ordinator, who is responsible for the drawing office time schedule made at the beginning of the contract. Each project is assigned to a contracts engineer, who handles engineering matters with the customer, co-ordinates all phases of the work within the organisation, and plans the placing of orders in relation to delivery dates to ensure that materials and equipment arrive on site in the correct sequence for erection. Regular monthly reports are rendered to clients on the production position of all materials which are required for the project.

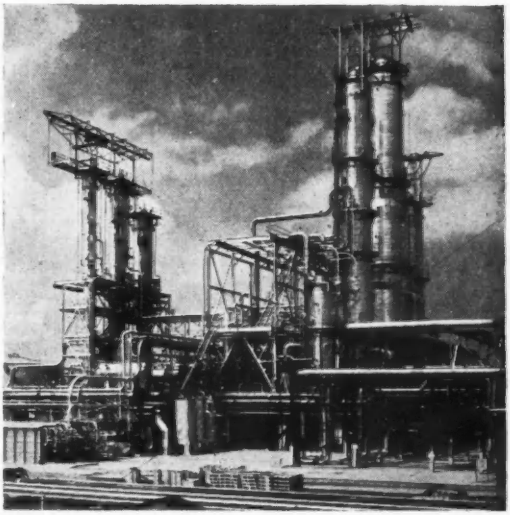
A large staff of specially trained expediting engineers visit all sub-contractors' works to correlate manufacture with the planned requirements of the project. In addition, teams of inspecting engineers are located in the industrial areas, their function being to ensure that the quality of the materials supplied is in accordance with the specifications. Including inspectors, and progress chasers, the production department has a staff of over 80. The site is investigated to determine local problems and construction is planned to follow a carefully proposed time schedule.

The company's works at Egham carry out the manufacture and assembly of a variety of specialised equipment ranging from air heaters to vacuum refrigeration plants and including condensers, superheaters, Dowtherm vaporisers, pressure vessels, and so on. Industrial boilers of Foster Wheeler, Ltd., design, ranging in capacity from 9,500 to 220,000 lb./hr. M.C.R., have been built at Egham and also under licence by Richardsons, Westgarth & Co., Ltd., and have been supplied to many well-known concerns in Britain and overseas. In addition, the works specialises in the fabrication of superheater tubes, furnace doors, and tube still components, for site-erected equipment.

Special Tools Developed

During the past 30 years special tools and fixtures have been developed at Egham and original work has been carried out which has become standard practice. Welding procedure, including X-ray examination, has been developed to meet modern construction methods where fabrication of large pressure vessels is required.

Besides carrying out many notable installations in the United Kingdom itself, the British company has successfully completed major projects in nine European countries; Burma, India, Iran and Iraq; in Egypt and South Africa; in Australia, South America, Trinidad and the Netherlands



Distillation unit at Shell's Stanlow refinery

Antilles. In handling overseas contracts Foster Wheeler, Ltd., are responsible for all phases of administration, including the setting up of suitable camping facilities at the site, appointment of a personnel manager for recruiting and staff welfare, establishing facilities for training and qualifying local labour, scheduling the work to suit the climatic conditions, and supervision of working sections. Contact is maintained between London and the construction superintendent overseas, so as to co-ordinate with the departments concerned the many problems arising during erection abroad.

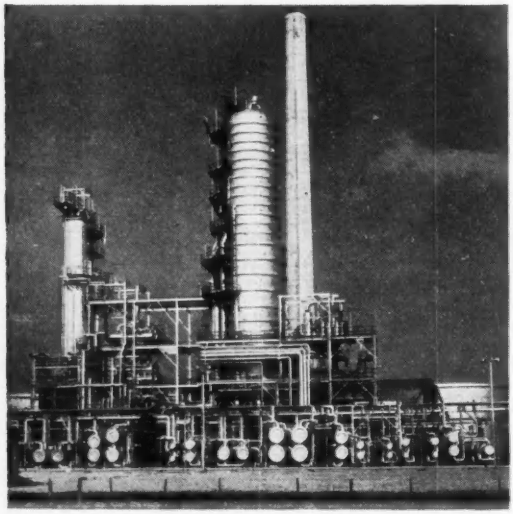
Experienced operating engineers are available to carry out the initial operation on all plants built by the company, advise the customer's operators, and conduct the tests required.

The magnitude of this company's operations is most effectively illustrated by its contributions to the expansion of petroleum refining. The complete units designed, built and erected by Foster Wheeler, Ltd., include plants for fluid catalytic cracking, vapour recovery, crude distillation, crude stabilisation, phenol extraction, polymerisation, hydrogen sulphide removal, propane deasphalting, solvent dewaxing, furfural refining, and ethylene manufacture. The company has supplied complete refineries, including steam plant, cooling towers, tankage, general piping, and other off-site facilities.

At Abadan the American corporation designed and built the world's largest catalytic cracking unit, with a daily capacity of 29,000 barrels, but Foster Wheeler, Ltd., obtained the Sterling portion of the equipment for this project and also supplied separately fired steam superheaters, gas heaters, and vacuum refrigeration plants.

The British company's most spectacular post-war achievements were the design and construction of plant for the Fawley refinery of the Esso Petroleum Company, the major items comprising a crude atmospheric distillation unit with a daily capacity of 66,000 barrels, a crude atmospheric and vacuum distillation unit of 60,000 barrels daily capacity, and a 41,000 barrels catalytic cracking unit.

Process designs for most of the units were set up by Standard Oil Development Company, and a master schedule was designed to get Fawley on stream in January, 1952. With the basic data in hand the project engineers proceeded with the immense task of supervising the preparation of over 10,000 drawings, each of which involved careful and specialised consideration. For each item it was necessary to decide whether to purchase or fabricate, the decision being influenced by time of delivery, price and quality. Over



Atmospheric and vacuum distillation units at Esso Petroleum Company's new Fawley refinery

3,500 purchase requisitions for material, labour and services were issued together with specifications and drawings.

Catalytic cracking requires the use of extremely large vessels when the capacity of the refinery approaches the size of the Fawley installation. The regenerator and reactor have diameters of 56 ft. and 35 ft. respectively. To save time and money fabrication on the site of many of the major process vessels was planned as a basic step in the construction sequence. By the end of 1951 over 15,000,000 man-hours of labour and 250,000 man-hours of supervision had been expended in the field construction of the refinery. At the peak of the construction period in April, 1951, 5,000 men were employed at Fawley.

A large sulphur recovery plant, which is expected to produce about 12,000 long tons of chemically pure elemental sulphur annually, is scheduled for completion during the current year. Two 'sour' gas streams will constitute the source of hydrogen sulphide for the sulphur recovery operation. Gas from the polymerisation unit will be cleaned by one of the hydrogen sulphide removal units. The resulting acid gas, 710,000 cu. ft. per 24 hours at 100°F., containing 88.9 per cent H_2S, will be charged to the sulphur recovery unit. The second source, gas from the catalytic absorber, will be cleaned by a second H_2S removal unit from which will be obtained 727,000 cu. ft. of acid gas per 24 hours, containing 76.75 per cent of hydrogen sulphide. The mixture of these two acid gas streams will be converted into elemental sulphur by a Foster Wheeler recovery unit.

For a refinery the size of Fawley a large amount of steam is necessary both for use as process steam and for steam-actuated mechanical auxiliaries. Foster Wheeler, Ltd., is manufacturing three stream generating units for the refinery, each of which will have a capacity of 110,000 lb. steam per hour at 150 p.s.i. and a final steam temperature of 465°F. using feed-water at 240°F. with a total heating surface of 6,400 sq. ft. Each unit consists of a two-drum water tube boiler equipped with superheater, airheater, soot blowers and burner equipment. The steam drum is 60 in. i.d. and the water drum 36 in. i.d. The water-cooled furnace will have an effective volume of 5,520 cu. ft. The superheater is of the two-loop pendant type. The tubular air heater incorporates a short cold end-section to facilitate replacement in the event of corrosion.

Other units designed and built for the Fawley refinery include a debuteniser tower, two copper chloride sweetening plants, catalytic polymerisation, propane deasphalting, phenol treating, dewaxing, white spirit

plant, vacuum pipe still, and solvent propane facilities.

Foster Wheeler, Ltd., was associated with the work in the drawing office and the progressing and inspection of the equipment for two copper chloride sweetening units at Anglo-Iranian's Grangemouth refinery, each of 8,000 barrels a day, and four similar units at the Kent refinery. The company has also supplied a solvent dewaxing plant for Kent, besides numerous heat exchangers and condensers. A contract has recently been received for the design and construction of a sulphur recovery plant for Grangemouth with a capacity of 20 tons a day.

Plants designed and built for the Royal Dutch Shell Group include crude atmospheric and vacuum distillation for the Shell Haven Refinery, a crude atmospheric and catalytic distillation unit and a catalytic cracking unit for the Stanlow refinery, a unit for the production of alcohols and ketones at the Stanlow Chemical Plant, and (in co-operation with other companies) the stabilising section of crude oil distillation and an alkylation unit for the Curacoa refinery. Five crude stabilisation units of 250,000 barrels daily capacity and one crude atmospheric distillation unit have been built since the war for the Kirkuk refinery of the Iraq Petroleum Company.

Vacuum Distillation Unit

A vacuum distillation unit of 25,400 barrels daily capacity was supplied to Trinidad Leaseholds, Ltd., together with a catalytic cracking unit, catalytic gasoline rerunning unit, and catalytic gasoline treating unit. Plants designed and at present under construction for the Standard-Vacuum Oil Company at Durban include a combination crude distillation and catalytic cracking unit with absorber, fractionator, reformer and stabiliser, together with SO_2 treating and offsite facilities. A fluid catalytic cracking unit with gas recovery plant and a propane decarbonising unit are being erected at Sydney for the California Texas Oil Company, Ltd.

Since the war Foster Wheeler, Ltd., has also designed and built chemical processing plants of various types. Processes for which installations have been supplied include acid concentration, benzene and ethylene production, coal tar distillation, fatty acid fractionation, fatty acid distillation, edible oil processing and deodorisation, phthalic anhydride, synthetic phenol, synthetic ammonia, synthetic resin, and synthetic urea.

Key Industry Duty

THE Treasury have made an Order under Section 10 (5) of the Finance Act, 1926, continuing from 19 February, 1953, until 18 August, 1953, the exemption from Key Industry Duty of all the articles exempted from that duty by previous Orders which expire on 18 February, 1953, with the addition of:—l-α-aminopropionic acid, l-α-aminopropionic acid, aminosulphonic acid, dl-malic acid, and Quinoline (not including *iso*Quinoline).

The following have been deleted from the list:—Cerium chloride (crude), Cerium sodium sulphate (crude), 2-*mono*aminoethyl alcohol, barium hydroxide, *n*-butyl alcohol, *iso*butyl alcohol, *mono*chloroacetic acid, cyclohexanone, di-*n*-butyl diethylmalonate, dicyclohexyl *ortho*phthalate, diethylene glycol monobutyl ether, diethyl malonate, di-(2-methylcyclohexyl *ortho*phthalate di-(3-methylcyclohexyl) *ortho*phthalate, di-(4-methylcyclohexyl) *ortho*phthalate, ethylene glycol monomethyl ether phthalate, ethylene oxide, *n*-heptoic acid, 3-hydroxyacetophenone, lithium carbonate, lithium chloride, lithium hydroxide, maleic anhydride, R. mannitol, melamine, pentan-2-ol, phenothiazine, phenylmercury acetate, *n-mono*phenyl-2-naphthylamine, *iso*phorone, potassium xanthate, *iso*propyl alcohol (unrefined, containing not less than 0.5 per cent by weight of ketones), quinoline, quinolinic acid, sodium dihydrogen orthophosphate, sodium 2:4:6-trichlorophenoxide, thionyl chloride, 2:4-xylenol, and 3:5-xylenol.

The Order is the Safeguarding of Industries (Exemption) (No. 1) Order, 1953, and is published as Statutory Instruments 1953, No. 188.

Praise for Packing

Praise for the way in which their balances were packed has been received from a Dutch firm by J. W. Towers & Co., Ltd. During the recent floods a consignment of balances and burette clamps were under sea-water in Rotterdam for ten days. When the cases were eventually found it was discovered that although the packing was soaked the burette clamps and even the balances were in perfect condition. Small wonder the customer felt obliged to write and thank Towers & Company for the care they had taken in packing the order.

Collaboration in Labour

Work of the ILO Industrial Committees

MUCH useful work has been accomplished by the Industrial Committees of the International Labour Organisation since they were first set up in 1945.

Broadly speaking it may be said that the Industrial Committees have a dual objective: to achieve an improvement in the work and social conditions in their respective industries, through collaboration and agreement between the parties concerned, that is employers, workers and Governments, and to participate in the general effort of the Organisation by making their contribution towards social progress and world peace.

The eight existing Industrial Committees (inland transport; coal mines; iron and steel; the metal trades; textiles, petroleum; building, civil engineering and public works; and chemical industries) have held a total of 29 meetings between the first session of the coal mines committee (London, December, 1945) and the fourth session of the petroleum committee (The Hague, October, 1952).

Each committee consists of delegates from a number of countries varying at present from 13 in the case of coal mines to 31 in the inland transport. The chemical industries committee, set up in 1946, represents the following 15 countries: Belgium, Brazil, Canada, China, Denmark, France, India, Italy, Mexico, the Netherlands, Norway, Sweden, Switzerland, the United Kingdom, and the U.S.A. In principle each member country sends to any particular committee two representatives each of Government, Employers and Workers, and also, if it is so desired, two advisers.

Sessions Every Two Years

Sessions are generally held at two-yearly intervals and last about 12 days. The agenda of each session includes, in addition to a general report, one or more technical questions. The general report deals with the action taken in the various countries in the light of the conclusions of the previous sessions and recent developments in the industry concerned. An example of the technical aspects is the report on vocational training in the chemical industries and general problems of hours of work in these industries, with particular reference to a comparison of day work and shift work made last year.

The three sessions of the Chemical Industries Committee have been Paris, April, 1948; Geneva, April, 1950 (THE CHEMICAL AGE, **63**, 43-44); and Geneva, September, 1952 (THE CHEMICAL AGE, **67**, 187-189, and **67**, 366). The reports so far have served mainly as working papers for the representatives of Governments, management and labour organisations who took part in the sessions.

Some stocks, however, are now available for distribution on a larger scale, including the following:—

Chemical Industries Committee, International Labour Organisation: 'Record of the First Session' (Paris, April, 1948). 'General Report' (Report I); 'Safety and Hygiene in the Chemical Industries' (Report II); 'The Organisation of Working Hours in the Chemical Industries' (Report III), all covered at the second session in Geneva, April, 1950.

Copies of particular reports or any additional information may be obtained from the director-general, International Labour Office, Geneva.

Atomic Energy Course

APPLICATIONS are invited by the Atomic Energy Research Establishment, Harwell, from physicists and electronic engineers holding a degree, or equivalent qualification, who wish to attend a specialised course on the design, use, and maintenance of electronic instruments used in nuclear physics, radiochemistry, and in work with radio-isotopes.

The course, to be held at the Isotope School, Harwell, will be from Monday, 16 March, to Friday, 20 March, 1953.

It is limited to 12 people and will include lectures and practical work on counters, D.C. and pulse amplifiers, coincidence units, scalers and ratemeters. The lecturers and demonstrators will be specialists from the Atomic Energy Research Establishment.

The Isotope School is outside the security fence and the subject will be entirely unclassified.

The fee for the course is 12 guineas, and living accommodation (at Buckland House, near Faringdon, one of the AERE Senior Staff Hostels), transport and morning and evening meals will be provided at a charge of 7 guineas. Application forms may be obtained from the Electronics Division, AERE Harwell, near Didcot, Berks.

The 'Accelator' Water Softening Plant

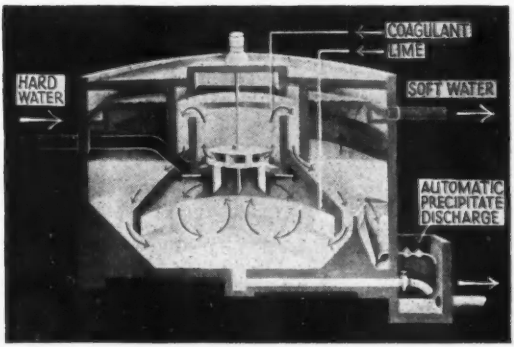
Lime-Soda Reagents Work Speedily & Efficiently

ONE of the difficulties often associated with the ordinary continuous flow lime-soda water softeners is the slowness of precipitation of the calcium carbonate, and more particularly of the objectionable magnesium (as hydrate). Not only is precipitation slow, but settlement and aggregation of particles require considerable time. Thus, the normal lime and soda ash precipitation softener requires at least three hours' retention and settlement in the cold. Even after this period the water leaving the settlement tank may contain considerable amounts of precipitate in suspension which throws much extra work on the filters, necessitating cleaning at frequent intervals, with expenditure of time, wastage of water and increase in net operating costs. Furthermore, in order to obtain the maximum degree of softening, excesses of reagents are used and the water leaving the softener has a high excess of alkalinity and *p*H value.

In general two methods can be adopted to overcome these difficulties. First is the use of coagulants such as aluminium sulphate, sodium aluminate and/or activated silica, which are added to the water just before or just after the addition of the lime and soda. The use of such coagulants produces a much coarser and denser precipitate which settles fairly rapidly, but when a water contains a high magnesium content there is always a portion of it remaining in the colloidal condition. The second method is known as 'seeding,' that is, when a crystal of a substance is dropped into a supersaturated solution of that substance it is said to be a 'seed crystal,' and rapidly reduces supersaturation by causing precipitation. It is common practice to maintain a bed of sludge at the bottom in order to provide the desired seed crystals. In the sludge recirculation type of plant the seeding principle is carried a stage further because an attempt is made to enable the softening reaction to proceed in the presence of seed crystals. In the past sludge of indefinite age and unknown composition has been circulated and while in some instances an improvement in precipitation has been noticed, in others the results have been little or no better than when no re-circulation has been used.

The Accelator plant manufactured by the Paterson Engineering Company, of Windsor House, Kingsway, London, incorporates the novel idea of actually allowing precipitation to occur in the presence of comparatively fresh pre-formed slurry and means are provided for circulating this fresh slurry with the water being softened. Furthermore, provision is made for maintaining this sludge bed in a mobile condition and in such a manner that it actually squeezes the softened water from the bed, thus giving a relatively clear softened water in the upper part of the plant.

With these modern lime-soda plants it is said that a very high degree of control is possible, in fact water softening plant can now be installed with a stability of perform-



A diagram showing the interior of the 'Accelator' water softener

ance equal to that of a modern power station.

In general the plant consists of a vertical and relatively wide diameter main outer steel plate cylinder containing an inner reaction portion formed also of steel plate. The raw water enters by an inlet pipe at the side of the main cylinder and passes to what is known as the agitator hood, a wide diameter circular closed chamber in the lower half of the main cylinder with a top hood or cover. The upper portion or extension of this hood is a vertical jacketed cylinder of lesser diameter reaching almost to the top of the main cylinder, and is known as the secondary main mixing zone, down the centre of which is a vertical shaft driven by a small electric motor at the top of the reduction gear, constituting a vertical paddle shaft. This latter extends to the bottom of the agitator hood chamber or primary mixing zone and is provided with agitators of the rotor type which give a violent agitation.

Lime & Soda Ash

The chemical reagents (lime and soda ash) enter by a pipe into the top portion of the agitator hood and the action of the agitator gives instantaneous and intimate mixing of the raw water with the reagents and also the slurry, which is forced up into the upper secondary mixing zone by the action of the rotor agitators immediately below. Also at the top of the secondary mixing zone the coagulant solution (aluminium sulphate or sodium aluminate) is added continuously. A more or less gentle agitation is given by the simple agitators already mentioned, operating in conjunction with the baffles.

Normally the lime and soda solutions are added in the form of a magma but if required they can be added separately so that in the case of a variable water the dose of either lime or soda can be altered independently to each other. The speed at which the softening process is carried out by the Accelator is shown by the fact that when samples are taken from the top of the centre tube it will be found that the reaction is almost complete. A sample of circulating slurry from the centre tube when allowed to settle in a cylinder starts to clear in a matter of seconds and within five minutes the supernatant liquor is said to be brilliantly clear.

The Accelator plant, it is stated, is capable of softening a new water of high calcium and magnesium hardness to give a clear stable filtered water low in hardness and with low excess alkalinity. The plant responds readily to variation in chemical dosage and the rapid settlement of the slurry shows how successfully the seeding principle has been applied to lead to the formation of large aggregates of great mechanical strength.

Pollution Inquiry by OEEC

METHODS used in the U.S.A. to combat air and water pollution caused by the chemical industry will be studied by a group of European experts and technicians if a proposal by the Chemical Products Committee of the Organisation for European Economic Cooperation receives sufficient support.

The committee believes that a study of the solutions found to these problems in the U.S.A. would greatly help the European chemical industry. It has therefore initiated an inquiry among member Governments of the OEEC, and their national Productivity Centres, to determine whether they would support the proposed mission.

Individuals and firms interested in such a study, and who feel they would benefit from discussing their problems with their colleagues in the U.S.A., are invited to get in touch with their national Productivity Centres without delay.

When replies to the OEEC inquiry have been received, meetings will be held to discuss the organisation of the mission. It is tentatively proposed that it should take place in the Autumn of this year.

Fast Colours for Velvets

THE new Staybinol dyeing process introduced by Balstone Cooke & Rayonese Ltd., Manchester, is said to offer for the first time fast colours at a popular price level exclusively for Balcora velvets and corduroys. The 36 colours in the range are dyed to a measurable standard of fastness to light and washing to conform to standards laid down by the British Standards Institution. Minimum standard for all shades dyed Staybinol is No. 2 washing and No. 5 light test. Customers must select shades from the firm's standard card; other shades cannot readily be accommodated but would have to be processed separately at an extra cost, the surcharge being dependent upon colour cost.

Canada's Expanding Plastics Industry

Need for Protection of the Home Market

NEARLY all branches of the plastics industry in Canada are engaged in plant expansion, according to V. G. Bartram, president of Canadian Resins and Chemicals Ltd. Reviewing the position and outlook of the industry at the beginning of the New Year, and its progress in the past 12 months, Mr. Bartram made the following report:

The over-all picture presented by the Canadian plastics industry in 1952 was one of widespread expansion activity and new developments, which would seem to indicate at first glance, excellent future prospects. Current development of a petrochemical industry in the western oilfields is rapidly changing the plastic raw materials supply situation, which means that Canada is becoming increasingly self-sufficient in basic raw materials for the plastics industry.

Wide acceptance which plastics have found on the consumer market and in industry is the basis of this expansion. Today there is scarcely any branch of Canadian industry in which plastics are not playing an essential part in meeting specific requirements for which no other type of material is suitable. They are regarded not as substitutes but as standard ingredients in the manufacture of vital parts in all industries, and have achieved their rightful position as a unique family of materials in which each has its own distinctive properties. Furthermore, the growth of many industries has been aided by the range of materials available through the plastics industry.

Development During the War

Development of the plastics industry in Canada began during the last war and since then circumstances have been opportune for the rapid growth which has characterised its history to date. With each year it has increased its efforts to keep up with an ever-growing consumer and industrial demand for its products.

While this widespread plant expansion was taking place in the Canadian plastics industry, however, a major expansion also occurred abroad. Many raw materials for plastics manufacturing are now available in Europe. Added to this is the dollar shortage situation overseas. The United Kingdom, formerly one of the leading export markets for Canada's plastics industry, and other European countries have now confined their trading to within the sterling area. The result is a dwindling export market for a number of Canadian plastic materials.

U.S.A. Imports Threat

Absence of former export markets for certain plastics would not be too important were it not for the fact that plastics imports from the U.S.A. present a serious threat to the domestic market which Canadian manufacturers have successfully built up through their own endeavours over a number of years. Canada's maximum market, a population of 15,000,000, approximately one-tenth that of the U.S.A., is sufficiently large to provide domestic manufacturers with an adequate sales volume to maintain an economic level of production, but not large enough to be shared with manufacturers of other countries.

American manufacturers in plastics look to their neighbour to the north as a convenient outlet for their surpluses, and this has created a difficult problem for Canadian plastics manufacturers. At present, the situation does not appear to be as unhappy as it was in the early part of 1952, since some plastic materials are at present in short supply in the U.S.A. However, this merely eases the situation temporarily and does not provide a permanent solution.

The underlying cause of the problem of U.S. plastics imports competing with Canadian goods on the domestic market is the wide difference in the tariff policies of the two countries. The U.S.A. has a tough tariff barrier which makes it almost impossible for Canadian plastics firms to export to that country. Canada, on the other hand, has an inadequate tariff structure which in many instances gives Canadian manufacturers practically no protection from having to share the domestic market with merchandise from abroad.

Fortunately, the plastics industry has its brighter side. While no review of it would be complete without presenting the problems which confront it in order that they may be carefully studied, they do not by any

means give the complete story. Although sales started off slowly at the beginning of 1952, they gradually improved and by the end of the year had reached a good level. Consequently, there is every expectation that this will continue for at least the first six months of 1953, if not longer.

New plastic materials are being continually produced and new applications made possible. The future for plastics in Canada continues to look promising, with a satisfactory domestic market. But, if the import of American and other plastics continues, it is doubtful whether many of the new plastic products will be 'made in Canada.'

Mexican Sulphur Plant

120 Tons per Day from Refinery Gases

DETAILS of the world's second largest sulphur recovery plant operated by Petroleos Mexicanos, Mexican government oil monopoly, at Pozo Rica, Mexico, were revealed for the first time in the 12 February issue of *Petroleum Refiner*.

Designed for Pemex by S. Schwartz, president of S. Schwartz & Associates, the New York consultants, in collaboration with the Allied Chemical & Dye Corporation, New York, and Arthur G. McKee Company, Cleveland, construction engineers, the plant was quietly brought on stream on the morning of Easter Sunday, 1951, at the height of the sulphur shortage, without fanfare or publicity. Very few details have since been released.

Currently the plant recovers approximately 120 net tons of pure sulphur daily from hydrogen sulphide and the output of this plant alone has reversed the entire sulphur economy of Mexico from that of a net importer to an exporter.

Comprising a furnace, boiler, catalytic converters and condensers, the plant is an excellent example of efficiency heretofore uncommon in Mexico. The waste hydrogen sulphide gas is burned in the furnace with a limited supply of air resulting in the formation of sulphur and sulphur dioxide. The excessive heat of reaction is reclaimed in a specially designed waste heat boiler in the form of high pressure steam which not only powers the plant's three large centrifugal blowers but supplements Poza Rica's central power plant about a half mile away. The boiler effluent products are passed through a catalytic converter 10 ft. in diameter by 65 ft. long wherein additional sulphur formation occurs. The heat generated is removed in the packed condensers by a circulating stream of molten sulphur flowing countercurrent to the sulphur laden gases. The liquid sulphur stream condenses the vapour and transfers its heat in six shell-and-tube heat exchangers to boiler feed water which supplies the city power plant. A small amount of unreacted hydrogen sulphide in the tail gas is destroyed in a catalytic oxidiser and the entire stream, consisting mainly of inert gases, is vented to the atmosphere.

The plant is unique in several respects due to problems of design and location. It recovers sulphur of better than 99.9 per cent purity —purer than Gulf Coast Frasch sulphur. The output is said to be exceeded only by Texas Gulf's Worland, Wyoming, plant which processes a 56 per cent acid gas compared with Pemex's concentration of only 16.3 per cent H_2S. The Pemex plant is the first to use a belt sulphur solidifier which avoids the expense and danger of blasting conventionally solidified sulphur.

Barytes Project Dropped

DURING question time in the House of Commons recently, Mr. James D. Murray, the member for North-west Durham, asked the Minister of Materials if he was aware that Athole G. Allen Ltd. had decided for the present not to proceed with the establishment of a barytes plant at Littleburn Estate in County Durham. This was apparently due to delays and lack of encouragement on the part of the Ministry and he wanted to know what steps were being taken to enable the firm to reconsider their decision.

Speaking on behalf of the Minister of Materials, Mr. Peter Thorneycroft said that as far as the Minister was aware Athole G. Allen had decided not to proceed with this plant on account of the fall in demand for barytes. He had been unable to trace any complaint of particular difficulties and had no knowledge of delays or lack of encouragement. If the company were in difficulties and would make them known to the Ministry, they would be given all possible assistance.

The Chemist's Bookshelf

INORGANIC CHEMISTRY: AN ADVANCED TEXTBOOK. By T. Moeller. Chapman and Hall, London. 1952. Pp. ix + 966. 80s.

No satisfactory general textbook of inorganic chemistry, at about degree level, exists. It is, of course, quite possible that at the present stage of development a completely satisfactory one is an impossibility, but American teachers and students as well as their British counterparts have been greatly hampered by the lack of one which approaches the ideal, even in a tentative way.

This book provides one of the most encouraging signs that has appeared for some years of the renaissance in inorganic chemistry. It has become increasingly obvious that in spite of its complexity inorganic chemistry, with increasing fundamental knowledge, is slowly but surely growing into a truly systematic branch of science. Existing textbooks, however, have failed to intermarry successfully such theory as is well established with the so-called 'systematic' chemistry of the elements and their compounds—that is, their actual properties and behaviour. As a consequence, inorganic chemistry has continued to be regarded by the many as a mass of isolated factual data to be laboriously memorised, and only rarely to be found to provide any satisfactory correlations either within themselves or with other branches of chemistry.

Unlike organic chemistry, where a single bond-type, fairly well understood, preponderates, inorganic chemistry must deal with all types of bonds, and many of the bonding problems that exist are but little understood. While the fact that inorganic chemistry is more difficult, and not merely more laborious than organic chemistry, should arouse the more ambitious of our younger chemists, it also makes the presentation of the subject in a satisfactory way a very difficult problem. Professor Moeller has made a most interesting and stimulating attempt to solve this latter problem. Spurred by the lack of a satisfactory text, he has written his own. It is designed to suit the courses with which he himself is concerned, but it can equally well suit others.

The detailed arrangement—the order in which the elements are discussed, for example—is not one with which everyone will agree, but the author presents reasonable arguments for his choice, which is, in some ways, an unusual one. Approximately one-third of the book is concerned with the physicochemical principles underlying inorganic chemistry, and the remainder is devoted to a systematic treatment of the elements and their compounds. This is an orthodox enough overall approach, but the refreshing thing about the author's treatment is that it is not possible here, as it so often is, to comment that the physical chemistry ought to be regarded as available in textbooks of physical chemistry and that the space taken up by it would be better spent otherwise. The cross-referencing, both forwards and back, produces a very close integration of the two sections, and, indeed, prevents any possibility of regarding inorganic chemistry as a mouthful of physical chemistry followed by a series of facts without reasons.

Treatment throughout is both stimulating and up-to-date. Anyone reading this textbook, even superficially, will undoubtedly acquire a fresh respect and a fresh enthusiasm for the infinite variety of inorganic chemistry: and this will be enhanced by closer study. In the systematic part the treatment is sufficient to take one well out of the range of the elementary textbook; but it is not so detailed as to obscure the patterns or portions of patterns which are beginning to emerge in this field.

While the price of this book may at first sight appear high, it is a large book, and this, in conjunction with the excellence of the contents, make it, in the opinion of the reviewer, well worth the money.—CECIL L. WILSON.

METHODEN DER ORGANISCHEN CHEMIE. (Houben - Weyl). Fourth edition. Edited by Eugen Müller with the collaboration of O. Bayer, H. Meerwein and K. Ziegler. Volume VIII (Sauerstoffverbindungen III). George Thieme Verlag, Stuttgart. Pp. xviii + 776. 1952. Moleskin. DM. 98.

The last appearance of a new edition of 'Houben' is most welcome as more than twenty years have elapsed since the last revision. The work is being completely rewritten, and the four volumes of the third edition will be replaced by about fourteen volumes of 700 pages each. Volume VIII is the first to be published; the others will appear within the next four years.

The general plan of the third edition has been slightly modified. Analytical methods are collected in a special volume, and a section dealing with the application of physical methods to organic chemistry is being added. The part of the work concerned with general methods (oxidation, reduction, catalysis, photochemical reactions, etc.) will include a chapter on the preparation of isotopic organic compounds and a section on free radicals. Natural products, dyes and compounds of high molecular weight are dealt with in a separate volume. A special index volume is also being prepared.

The volume under review is part of the section which deals systematically with the methods of preparation and reactions of various classes of organic compounds. Peroxides, derivatives of carbonic acid, nitriles, carboxylic acids, esters, and nitrogen containing derivatives of the carboxyl group are discussed by expert authors including Professor R. Criegee and Dr. H. Henecka. The treatment is more selective than in the last edition, and methods of formation which are not of preparative value are mentioned only very briefly. Some of the chapters are spiced with brief discussions of reaction mechanisms but on the whole the approach is intensely practical. Full experimental details of important reactions are given, and precautions to be observed in working with dangerous substances are described. The usefulness of the book is increased by a number of clear tables. A most valuable feature is the detailed treatment by contributors from industry of many methods which have only been described in the patent literature. Much useful work done in Germany during the war is also made more readily accessible.

The collaborators have attacked their task with great devotion. If the subsequent volumes maintain this high standard, the new 'Houben' will be of great value to all organic chemists. The volume is well printed and handsomely bound. A reduction of 10 per cent is offered on volumes ordered before publication.—J.C.P.S.

MOLYBDENUM COMPOUNDS: THEIR CHEMISTRY AND TECHNOLOGY. By D. W. Killeffer and A. Linz. Interscience Publishers, New York and London. 1952. Pp. xiv + 407. $11.00.

Although the title suggests that this book deals only with molybdenum compounds, it is really a monograph on the element and its compounds, their sources, properties and uses. The chemistry of this element might hardly warrant such a large book, but on examination it is found that approximately one-half of the book is devoted to indexes of the patent and other literature dealing with molybdenum catalysts. The remainder of the book is a useful survey of molybdenum chemistry.

The sources and physical and chemical properties of the element are thoroughly presented, and several chapters deal with the oxides, sulphides and halides, and the many anionic forms of molybdenum, both in the form of molybdate and in the heteropoly and related compounds. A useful survey of the structural chemistry of molybdenum has been contributed by Linus Pauling. The interesting relation of the element to biological processes is briefly considered, followed by a chapter dealing fully with the analytical chemistry. Finally, the uses of the element and its compounds are fully described.

This book brings together a body of information which was previously widely scattered and frequently not readily available. Like all transition elements, the behaviour of molybdenum is complex and only partly understood. This book emphasises the gaps which still exist in our knowledge regarding the element, and which previously were not so readily apparent. The approach is primarily that of the industrial chemist, but theoretical considerations are not ignored. This is a useful addition to the available monographs on inorganic elements.—C.L.W.

HOME

Travelling Exhibition

Both industrial and domestic applications of plastics will be displayed at a travelling exhibition, organised by Bakelite Ltd., which will visit Portsmouth and Bristol next month. The exhibition will be open daily from 10 a.m. to 8 p.m. as follows: Portsmouth 3, 4 and 5 March, business card or invitation; 6 and 7 March, general public. Bristol 17, 18 and 19 March, business card or invitation; 20 and 21 March, general public. The wide range of uses of 'Bakelite' thermosetting plastics, 'Vybak' thermoplastics and 'Warerite' decorative materials will be demonstrated.

Removal of Restrictions

Some of the restrictions on the production, sale or use of certain oils and fats were removed on 15 February when the Oils & Fats Order, 1953 came into force. The remaining restrictions on the production and use of linseed oil were removed and licences to crush linseed are now no longer needed. Producers may sell and food manufacturers may buy and use, subject to certain conditions, technical tallow and rendered pig fat (other than lard) that is wholesome and suitable for human consumption.

Hinchley Medal Address

The award of the Hinchley Medal by the British Association of Chemists this year has been made to Herbert Levinstein, M.Sc., Ph.D., M.I.Chem.E., F.R.I.C., and the presentation will take place in The West Hall of the Royal Society of Medicine, 1 Wimpole Street, London, W.1, on Friday, 27 February, at 6.30 p.m. Dr. Levinstein, who is a trustee and past-president of the British Association of Chemists, will give his address on 'Our Changing Chemical Industries—An Appraisement.' Prior to the presentation there will be a brief opening ceremony at the BAC's new headquarters at Hinchley House, 14 Harley Street, W.1. The premises will be open for inspection by members and refreshments will be provided from approximately 5 p.m. The Royal Society of Medicine building is only a few yards from Hinchley House.

Society of Visiting Scientists

A discussion meeting on 'The Chemistry and Interrelationship of Endocrine Systems and their Psychological Effects' will be held by the Society of Visiting Scientists, Ltd., at 5 Old Burlington Street, London, W.1, on 26 February. The chairman at the meeting will be A. S. Parkes, Sc.D., F.R.S., and the speakers—Professor F. G. Young, D.Sc., F.R.S., Professor Jean Roche and Professor G. W. Harris, M.D., Sc.D. The meeting, which commences at 7.30 p.m., will be preceded by dinner at 6.15 p.m. in the society's dining room. Those intending to have dinner are asked to inform the assistant secretary.

Pease Anthony Scrubbers

The Power-Gas Corporation, Ltd., Stockton-on-Tees, who are the licencees for the Pease Anthony Scrubbers, now have a pilot plant unit available for experimental purposes on a variety of applications. The unit, which is mobile, can handle 500 cu. ft. of gas per minute and is capable of dealing with micron and sub micron dusts and fumes.

Wulff Process Agreement

The Fluor Corporation Ltd. has entered into an agreement with the Wulff Process Co. under which Fluor is authorised to design and construct plant for application of the Wulff Process. The process uses natural gas, ethane, propane, butane or any L.P.G. mixture as feed stock and produces low cost acetylene. It may be applied to plants making as little as 1 ton per day acetylene, or as much as 100 tons per day. The process can be operated to produce substantial yields of commercial grade ethylene simultaneously. The Fluor Corporation is represented in the sterling area by Head Wrightson Processes Ltd., Teesdale House, 24/26 Baltic Street, London, E.C.1.

Petroleum Products Deal

An agreement has been concluded between the Esso Petroleum Company and the Danish Esso Company, under which the Danish firm will purchase during 1953 between 600,000 and 700,000 tons of petroleum products valued at more than £7,000,000 from Esso's refinery at Fawley.

• OVERSEAS •

Monsanto Research Laboratories

Monsanto Canada (Ltd.), officially opened its new $400,000 research laboratories and pilot plant at Ville LaSalle, P.Q., on 23 January. To be named the L. G. Ryan Research Laboratories in honour of Leo G. Ryan, chairman of Monsanto Canada's board of directors and founder of the Canadian company, the building will house the latest in chemical research equipment. The staff will conduct both fundamental research and applied research in the field of industrial chemistry. Activities will be under the direction of Dr. J. F. Leger.

Uranium Discovery

A uranium discovery near Bancroft, 130 miles north-east of Toronto, has been announced by the Tungsten Corporation of Canada and Associates. The Corporation has provided 50 per cent of the finances for the work to date at a cost of $25,000. Centre Lake Uranium Mines has been formed to develop this new discovery with a capital of 3,000,000 shares.

Carbon Dioxide Wells

The Gas-Ice Corporation recently reported it had brought in two carbon dioxide wells in the Shuswap area, north of Vernon, B.C. Mr. Charles Gorse, president and chief engineer of the company, said there also was some natural gas with the carbon dioxide but that it was impossible to say whether or not they had discovered a large natural gas field until the analysis had been completed. The wells are situated in the southern end of Mora Lake near the Canadian Pacific Railway's Okanagan-Mainline route. Gas was found at two sites at levels of 245 and 160 feet. Mr. Gorse said the company would move in larger rigs to probe the find.

Glass Fibre Project in Johannesburg

The first glass fibre to be made in South Africa is now being produced in Johannesburg by the Glass Development Corporation (Pty.), Ltd., on a pilot plant. While this is able to meet present requirements, demand is expected to increase and further capital outlay will probably be necessary to develop and improve output.

To Double Capacity

The Creole Petroleum Corporation has announced plans to double the present capacity of its largest refinery at Amuay Bay, Venezuela. When the new installations are completed, the Corporation will refine nearly 200,000 barrels of crude oil daily. The construction of the additional plant will begin this year and take two years to complete.

Cleansing Chemicals in Durban

Industrial chemicals and detergents are among the new items being manufactured at a modern factory in Durban recently opened by P.3 Products (Pty.), Ltd. Typical of these is P.3.Z, for cleaning plant and equipment in which aluminium alloys or tinned materials are employed. P.3Z possesses, it is claimed, properties which not only protect metal but also destroys germs, thus making it valuable for sterilising purposes in the dairy and other industries. The company also produce P.3S designed for the removal of difficult deposits of grease, fat, and oil in fish canning, oil mills and margarine plants.

Pakistan Prohibits Exports

Chrome ore can no longer be exported from Pakistan as previously provided under the Open General Licence No. 7, under item No. 5, notification No. 335/460/42 dated 22 October, 1952, says a notification published by the Ministry of Commerce, Government of Pakistan. The order came into force on 28 January, 1953.

Venezuelan Paint Industry

A new paint factory, the Fábrica de Penturas Tucan, has recently started large scale production in Venezuela. The factory has modern equipment and the company, which has a capital of 2,500,000 bolivares, plans to erect a varnish factory beside the present plant. The building boom has created an enormous demand for paints and varnishes in Venezuela but when this latest factory is in full production it is estimated that domestic paint production will be able to satisfy this demand and imports of paints will be unnecessary. In 1951 imports of paints amounted to 12,500,000 bolivares.

PERSONAL

In our issue of last week it was reported that MR. L. A. ELGOOD was relinquishing the chairmanship of The Distillers Co., Ltd., and that MR. C. G. HAYMAN had been appointed chairman of the management committee with effect from 1 April. The report should have stated that Mr. Elgood will relinquish the chairmanship of the management committee as from 31 March and that he will be succeeded by Mr. Hayman. Mr. Elgood, who has held the office for several years, will remain a member of the committee.

MR. J. A. PENNY, manager of the Grangemouth soapworks of the Scottish Co-operative Wholesale Society Ltd., since 1910, was guest of honour at a recent gathering in Grangemouth Town Hall. The new manager, MR. ANDREW SUMMERS, presided over the gathering at which Mr. Wallace Ferguson, S.C.W.S. director, handed Mr. Penny a cheque, together with good wishes for his retiral. Other gifts included a radio set, a Bible and a table. Speakers paid tribute to Mr. Penny's qualities of leadership and management and it was mentioned that he had been the youngest manager ever appointed by the S.C.W.S.

The Scottish Banch of the Institute of Petroleum, meeting recently in Glasgow, elected MR. J. M. CALDWELL, president, in place of MR. ROBERT CRICHTON who has held office since the formation of the Scottish Branch in 1928. Vice-chairman is PRINCIPAL H. B. NISBET, and hon. secretary, MR. W. M. STIRLING, of Middleton Hall, Uphall, West Lothian. Treasurer is DR. G. H. SMITH, and Hon. Recorder, DR. W. B. PEUTHERER.

DR. W. C. J. ROSS has been appointed to the Readership in Chemistry at the Institute of Cancer Research, Royal Cancer Hospital, London.

MR. GEORGE BREARLEY, B.Sc., F.R.I.C., M.I.Chem.E., managing director of Brotherton & Co., Ltd., has resigned from the board. Mr. Brearley is chairman of both the Chemical Group of the Association of Chemical and Allied Employers and of the North-Western Branch, Institution of Chemical Engineers.

France has made MR. DONALD W. HUDSON, chairman of the National Pharmaceutical Union and a member of the Council of the Pharmaceutical Society, an Officier de l'Ordre de la Santé Publique in recognition of his services as chairman of the Franco-British Pharmaceutical Commission.

It was announced in the London Gazette on 13 February that SIR CLIVE LATHAM BAILLIEU, chairman of the Dunlop Rubber Company, will be known by the style of Lord Baillieu of Sefton in the Commonwealth of Australia and of Parkwood in the County of Surrey. Lord Baillieu had a barony conferred on him in the New Year's Honours list.

Obituary

The death has taken place at the age of 90, of MR. HENRY CLARKE PICKERING, who was with the Manchester chemical firm of Higginbottom and Co., Ltd., of Spring Gardens, for 70 years. For 30 years Mr. Pickering was a principal and he worked up to three years ago.

Houston Plant Purchased

Property formerly occupied by the Chipman Chemical Company, and consisting of a chemical plant, warehouse space, office building and railroad side located at 401 Yale Street, Houston, Texas, has been purchased for immediate occupancy by the Gulf Alkali Corporation of New York and Houston. At the same time it was revealed that Gulf Alkali Corporation had taken over the Red Circle Products Company, makers of packaged chemical products for over 25 years.

Headquarters Moved

Semtex, Ltd., have moved their headquarters from Finchley Road to Semtex House, The Broadway, Welsh Harp, London, N.W.9.

Publications & Announcements

FIRST commercial production of trioxane, a crystalline form of formaldehyde, is announced by the Chemical Division of the Celanese Corporation of America. Trioxane (Alphatrioxymethylene) with its cyclic ether structure, is an excellent solvent and reaction medium, and may also be used in conjunction with polar and non-polar solvents to enhance their solubilising properties. It can be used as a component of air deodorisers, tanning agents, thermosetting resins, and electroplating baths. Other characteristics make it a suitable setting agent for protein materials and as a stabiliser for trichloroethylene and zein solutions. Full particulars of the physical properties, specifications and other data on trioxane are given in the New Product Bulletin N-31-1, which may be obtained on application to the Chemical Division, Celanese Corporation of America, 180 Madison Avenue, New York, 16, N.Y.

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METALLURGICAL research in uranium, manganese and nodular cast irons undertaken at the Colorado School of Mines is described in the January, 1952, issue of the college Quarterly journal (Vol. 47, No. 1). The three articles, illustrated by photographs and diagrams deal with: 'Spectrographite Analysis of Carnotite Ores for their U_3O_8 Content' (James M. Warfield); 'A Process for the Recovery of Manganese from Ores' (Thomas Andrew Hendrickson); and 'An Investigation of the Effect of Heat Treatment Upon the Hardness, Microstructure and Combined Carbon Content of Some Nodular Cast Irons' (James H. Barnett).

* * *

OVER 2,300 items are contained in its 1953 list of fine organic chemicals issued by L. Light & Co., Ltd., Poyle Trading Estate, Colnbrook, near Slough, Bucks. Many of these chemicals have not previously been available to research workers and 27 of the latest additions are shown separately at the end of the list. Building of the laboratories, begun in 1951, has now been completed and visitors are invited. In order to fulfil its function of providing organic research chemists with new reagents the company asks that any reactive organic compounds surplus to requirements may be forwarded to them. For its 1954 catalogue the company is anxious to assemble a number of alkaloids and glycosides of which the constitution is, as yet, unknown. Customers are asked to co-operate by searching their shelves for unwanted specimens. On receipt of lists of these products, with quantities available, Light & Co., Ltd., will make an offer to be paid in cash or by issue of a credit note. Copies of 'Light's Organic Chemicals,' 1953 edition, may be obtained on request.

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OWING to the great variety and the frequent complexity of scientific glass apparatus, there has been little interest in speeding and improving its production in the laboratory. Mechanical aids would, however, be particularly suitable for the laboratory production of standard and special types of widely used apparatus. This need has long been appreciated by the British Coal Utilisation Research Association which has designed a machine to bridge the gap between the employment of skilled glassblowers and the use of elaborate and expensive lathes. The machine, which can deal with all but the largest and heaviest work in both soft and borosilicate glasses, is described in an illustrated article 'A New Outlook in Scientific Glassworking,' which appears in the *BCURA Quarterly Gazette* (No. 17, 1953).

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ANTICIPATING a demand for the welding of thick aluminium alloy plate the British Welding Research Association initiated, several years ago, an investigation into the welding of heavy gauge medium-strength aluminium alloys by the metal-arc process. An 'Interim Report on an Investigation of the Arc Welding of Thick Aluminium—5 per cent Magnesium Alloy' by J. G. Ball and P. T. Houlcroft is contained in the December, 1952, issue of *Welding Research* (Vol. 6, No. 6). A further report on the subject will be published later this year. Other features in the current issue include an article on 'Fatigue Tests on Defective Butt Welds,' by W. G. Warren, R.C.N.C., and a report by the meeting of the International Institute of Welding on the work of commission No. 10/11 under the chairmanship of Dr. R. Weck on 'Residual Stresses and Stress Relieving.'

GUIDANCE on the design of metal arc welded steel building structures is given in Technical Brochure No. 6 'The Use of Welding in Steel Building Structures,' issued by the British Constructional Steelwork Association. A large proportion of constructional work lies within the scope of the work and it may be said that in this field there is rather more need for education in the use of welding. The present publication includes: fillet and butt welds and their use in typical structural details; designs of a welded plate girder, welded plate crane girder, and welded built-up stanchions; general notes on the practicability of welding; and notes on Drawing Office procedure.

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BEHAVIOUR of various adhesives using R.F. heating is discussed in Bulletin No. 121 of *Aero Research Technical Notes* (January, 1953), issued by the Technical Service Department, Aero Research, Ltd., Duxford, Cambridge. The bulletin is based on a report from the Timber Technology Research Institute, Stuttgart Technical University, and deals with an investigation into the possibility of splicing standard sleepers into crossing timbers by using glued forkhead joints. Some of the technical problems discussed have a much wider interest. A first selection of adhesives was based upon comparative tests. Trials for strength were carried out and values were obtained for several adhesives after various conditioning processes. The best results were obtained with the resorcinol resin 'Aerodux' 185 which gave high strength values after both hot and cold curing, and with predried sleepers as well as with sleepers of a moisture content exceeding 40 per cent ready for impregnation treatment.

* * *

FROM the days in 1837 when it was known in Glasgow as 'Griffin's Bazaar' (a description, fashionable at the time, to indicate the variety of scientific apparatus held in stock), to the present day, Griffin & Tatlock, Limited has been held in high esteem. The company's latest catalogue of chemicals and Reagents (No. 66, C.R.) has just been issued. Type for this edition has been set in double column form for ease of reference, and, with a few exceptions, the metric system has been adopted throughout in accordance with current trends in the laboratory chemicals industry in Britain and for the convenience of customers abroad. A range of pre-packed chemicals in convenient quantities, designed to facilitate ordering and to enable orders to be fulfilled rapidly, has been introduced. Each appropriate bottle closure is sealed with a Viscose cap to prevent the contamination of the contents. Copies of the catalogue are available free on request for use in laboratories engaged in research analysis, education and industry.

* * *

LABELLING in many forms—from adhesives and plain coated and uncoated label papers to every known form of adhesive paper—is covered in an illustrated brochure 'The Manufacturers' Guide to Packaging and Packing' issued by Samuel Jones & Co., Ltd., London. The contents include notes on labelling by hand and by heat; tacky lebels, gum-strip sealing tape; inner parcel, post parcel, container and bale, sealing; waterproof and fancy papers; and self-adhesive tapes and dispensers.

* * *

IN buying equipment for an academic laboratory, a primary consideration is that the apparatus chosen should be applicable to as many different uses as possible. Particularly is this the case in spectroscopy, where each of the many applications, in widely separated spectral regions, seems at first sight to demand its own special instruments. The latest model of the constant deviation wavelength spectrometer described and illustrated in its publication CH.241/7 (January, 1953), by Hilger & Watts, Ltd., London, has been so designed that any or all of the accessories may be purchased at subsequent times with the full confidence that they will fit into position in complete adjustment without workshop aid. At the same time a number of new accessories have been provided which will facilitate the use of standard parts in other assemblies. Another January 1953 issue by the company is an illustrated brochure (CH.123/3) describing the range of Hilger vacuum grating spectrographs, designed for emission and absorption spectroscopy at wavelengths shorter than the transmission limit of the atmosphere. Basic arrangements of the instruments now follow conventional lines, but the designs have been made in accordance with modern high vacuum technique.

Next Week's Events

MONDAY 23 FEBRUARY

Institution of the Rubber Industry

Manchester: Engineers' Club, Albert Square, 6.15 p.m. Dr. G. F. Bloomfield (British Rubber Producers' Research Association): 'The State of the Rubber Hydrocarbon in Freshly Tapped Latex.'

Royal Society of Arts

London: John Adam Street, Adelphi, W.C.2, 6 p.m. First of two Cantor Lectures: 'The Safety Factor in Construction,' by G. Anthony Gardner, chief structural engineer, Ministry of Works.

TUESDAY 24 FEBRUARY

Society of Chemical Industry

London: Burlington House, Piccadilly, W.1, 6.30 p.m. Joint meeting of the Chemical Engineering Group with the Plastics and Polymer Group. E. K. Earp, S. Shapiro and A. E. Wiggs: 'Synthetic Resin Cements used in Chemical Engineering Practice.' V. Evans: 'Corrosion-Resisting Properties of Some Synthetic Resin Cements.'

Royal Institute of Chemistry

Bolton: The Technical College, 7 p.m. Dr. R. J. W. Reynolds (Dyestuffs Division, I.C.I. Ltd.): 'Fibres from Synthetic Polymers.'

Institution of Works Managers

Wolverhampton: Star and Garter Royal Hotel, 7 p.m. Joint meeting with the Institution of Plant Engineers. H. G. Hilton (member of the team): 'Report of the U.K. Specialist Team on Plant Maintenance.'

WEDNESDAY 25 FEBRUARY

The Chemical Society

Dublin: Trinity College, 7.45 p.m. Joint meeting with the Institute of Chemistry of Ireland. Professor Wesley Cocker: 'Some Aspects of the Chemistry of Butenolides.'

The Royal Institute of Chemistry

London: Norwood Technical College, Knight's Hill, S.E.27, 6.30 p.m. Dr. A. G. Maddock, a lecture on 'Atomic Science.'

Manchester Literary & Philosophical Society

Manchester: Portico Library, Mosley Street, 7.30 p.m. Meeting of the Chemical Section.

THURSDAY 26 FEBRUARY

The Chemical Society

Gloucester: The Technical College, 7.15 p.m. Joint meeting with the RIC, SCI, and the Plastics Institute. T. W. M. Pond: 'Construction of the British Resin Factory at Barry.'

Liverpool: The University, 5 p.m. Joint meeting with the RIC, SCI, and BAC. Professor A. R. Ubbelohde: 'Recent Studies Relating to Hydrocarbon Oxidation.'

London: The Royal Institution, 21 Albemarle Street, W.1, 7.30 p.m. Centenary Lecture. Professor A. Tiselius (Uppsala University): 'Some Applications of the Separation of Large Molecules and Colloidal Particles.'

Sheffield: The University, 7.30 p.m. Dr. J. O'M. Bockris: 'Electrode Kinetics.'

Royal Institute of Chemistry

Dagenham: South-East Essex Technical College, Longbridge Road. Joint meeting with the London Section, SCI. Dr. K. G. A. Pankhurst: 'The Physics and Chemistry of Detergent Solutions.'

Society of Chemical Industry

London: Institution of Electrical Engineers, Savoy Place, W.C.2, 6.15 p.m. Microbiology Group, joint meeting with the Food Group. 'Pathogenic Organisms in Food.' Dr. C. Cockburn: 'Epidemiology of Food Poisoning'; Dr. R. E. O. Williams: 'Staphylococci and other Gram Positive Cocci'; Dr. Joan Taylor: 'Enterobacteriaceae.'

The Fertiliser Society

London: Burlington House, Piccadilly, W.1, 2.30 p.m. M. Garés (of the Societé Commerciale des Potasses d'Alsace): 'Potash Mining and Production'; Dr. G. A. Cowie: 'Potash Utilisation in Agriculture.'

Institution of Engineering Inspection

Manchester: Engineers' Club, Albert Square, 7.30 p.m. Dr. H. J. Axon: 'Metallurgical Topics in the Manchester Memoirs.'

FRIDAY 27 FEBRUARY

The Chemical Society

Exeter: Washington Singer Laboratories, Prince of Wales Road, 5 p.m. R. P. Bell: 'Physical Chemistry of Acetaldehyde and Some of its Reactions.'

Newcastle-upon-Tyne: King's College, 4 p.m. Reading of original papers.

Institute of Metal Finishing

Sheffield: Grand Hotel, 6.30 p.m. L. Mable: 'Methods of Metal Polishing.'

[continued on page 330

Law & Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur

Mortgages & Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary but such total may have been reduced.)

MANCHESTER OIL REFINERY (SALES), LTD., London, W. (M., 21/2/53). 16 January, collateral charge, to District Bank, Ltd., securing all moneys due or to become due to the bank from Manchester Oil Refinery, Ltd., and secured by charge date 4 April, 1949; charged on company's present and future stock, book debts, etc. *—. 2 October, 1952.

PEST CONTROL, LTD., Bourn (Cambs.). (M., 21/2/53). 13 January, two mortgages, to Temperance Permanent Building Society, respectively securing £2,000 and £1,700 and any other moneys, etc., in each case; respectively charged on Southwind, Hauxton, and 95 Cherryhinton Road, Cambridge; also 15 January, £3,200 mortgage, to Abbey National Building Society; charged on 84 and 84a Hills Avenue, Cambridge. *£633,527. 9 June, 1952.

Company News

F. W. Berk & Co. Ltd.

The directors of F. W. Berk & Co., Ltd., announce that the dividend on the 4½ per cent preference shares for the year ended 31 December, 1952, will be paid on 1 March. Transfer books will be closed from 16 to 28 February, 1953.

Howards & Sons Ltd.

The directors of Howards & Sons, Ltd., have announced that figures for the year to 31 December, 1952, so far available, indicate that the company has had a most disappointing year's trading and that for the second half of the year it was operating at a loss. During the first five months of 1952 the volume of business had been well maintained but in June there was an unexpected and extremely sharp recession in trade which continued and may have resulted in eliminating the profits earned in the earlier months. As there is no reliable indications of improvement in the company's business, the directors have decided to defer consideration of the payment of an ordinary dividend until the latter part of April when the audited accounts for 1952 are available.

Redfern's Rubber Works

At the annual general meeting of Redfern's Rubber Works, Ltd., on 31 March, the directors will recommend the following dividends to be paid: 3½ per cent on A and B preference shares making 7½ per cent for the year, and 5 per cent on the ordinary shares making 10 per cent for the year plus a bonus of 7½ per cent. Net profit for the year amounted to £35,416 compared with £66,698 in 1951. The net amount absorbed by the dividends proposed and the interim dividend amounted to £15,750 (£17,325). Results have been affected by the writing down of stock values consequent upon the fall in the price of raw rubber.

Next Week's Events

continued from page 328

Middlesbrough: Cleveland Scientific and Technical Institution, 7.15 p.m. G. M. Michie: 'Steelfoundry Radiographic Practice.'

Institution of Electronics

Manchester: Reynolds Hall, College of Technology, 7 p.m. Dr. J. S. Blakemore (Standard Telecommunication Laboratories, Ltd.): 'Recent Advances in Understanding Semi-Conductors and their Application for Rectifier and Transistor Operation.'.

Plastics Institute

Manchester: Engineers' Club, Albert Square, 6.45 p.m. Dr. R. G. Heyes (Plastics Division, I.C.I., Ltd.): 'Some Aspects of Ethenoid Plastics.'

SATURDAY 28 FEBRUARY

Royal Institute of Chemistry

London: Caxton Hall, Westminster, S.W.1, 7.30 p.m. till 11.45 p.m. Buffet dance, with the London Section SCI, in aid of the Benevolent Fund (RIC) and Hospitality Fund (London Section, SCI).

Market Reports

LONDON.—A steady movement of supplies to the home consuming industries has been reported from most sections of the market during the past week.

The improvement in the volume of new business continues to be maintained and the demand for shipment is satisfactory for the period.

There has been no outstanding price changes reported and quotations generally are steady at recent levels but fluctuations in the chemical compounds of lead continue; the latest quotation for red lead and litharge being £125 5s. per ton.

Among the coal tar products there has been a better inquiry for crude carbolic acid and for creosote oil. Quotations for naphthalene are easier.

MANCHESTER.—Fairly active trading conditions have been reported on the Manchester chemical market during the past week. The recent improvement in both inquiry and actual business seems to have been fully maintained, with a better call for supplies from the textile and allied trades, including the cotton and rayon sections. There has been some easing of prices here and there, but taking the market as a whole conditions are steady. Increasing activity is being experienced in the market for fertilisers, with a brisker demand for superphosphates, sulphate of ammonia and certain other lines. In the tar products section, conditions are much the same as during recent weeks.

CLASSIFIED ADVERTISEMENTS

SITUATION WANTED

The engagement of persons answering this advertisement must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 *inclusive, or a woman aged* 18-59 *inclusive, unless he or she, or the employment, is excepted from the provisions of the Notifications of Vacancies Order,* 1952.

BUYER seeks post London, excellent knowledge Scientific Instruments, Chemicals, Laboratory Equipment, Raw Materials. Used to handling staff, stores, stock and purchasing control. Twenty years' experience Scientific Buying. **BOX NO. C.A. 3196, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

FOR SALE

ONE—AUTOMATIC WEIGHING MACHINE, ½–2½ lb. 14/16 per minute, complete with overhead hopper and agitator. By Automatic Weighing and Packing Machine Co. Seen London. Write Box 52, c/o **WALTER JUDD, LTD., 47, GRESHAM STREET, LONDON, E.C.2.**

5—CENTRIFUGES. Water driven. 48 in. by 20 in. Working speed 950 r.p.m. Water pressure 250 p.s.i. Complete with fittings. Unused. Excellent condition. **APPLY BOX No. 3198, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

2—**HOWARD HVL. ROTARY PUMPS.** 10 galls. minute Light Hydrocarbons at 175 p.s.i. Mounted on Bedplates. Main Glands fitted flexibox seals. Without motors.

1—**HOWARD OHL DE** Double ended Proportiometer **PUMP.** 3 g.p.m. Hot Caustic Soda against 50 ft. Delivery Head ¾ h.p. Brook Flameproof motor. Mounted on Bedplate.

1—**HOWARD OHL SE** Single ended Proportiometer **PUMP.** Output 40 g.p.h. against 25 ft. head. Body "Ni-Resist." Valves, seats and plungers—Stainless Steel. Complete with ¾ h.p. Brook Flameproof 1,450 r.p.m. motor. Mounted on Baseplate.

1—**HOWARD OHL SE** as above but output 40 **GPH.** Hydrocarbon Liquids at 100 p.s.i. and without motor. Apply **BOX No. 3199, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

4—**CLYDE** Fuel Positive Rotary Oil Gear **PUMPS.** Driven direct through Flexible Couplings by 1 h.p. Flameproof M.V. motors. 4 **GPM.** against 50 ft. head. Apply **BOX No. 3200, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

1—**MANESTY No. 1A.** Steam heated Automatic **WATER STILL.** Output 4 galls. per hour. Apply **BOX No. 3201, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

CHARCOAL, ANIMAL AND VEGETABLE, horticultural, burning, filtering, disinfecting, medicinal, insulating; also lumps ground and granulated; established 1830; contractors to H.M. Government.—**THOS. HILL-JONES, LTD., "INVICTA" MILLS, BOW COMMON LANE, LONDON, E. TELEGRAMS: "HILL-JONES, BOCHURCH LONDON," TELEPHONE 3285 EAST.**

FORGED STEEL PRESSURE VESSEL, 44 ft. long by 4 ft. 3 in. i.d. by 4 in. thick. **WORKING PRESSURE,** 2,000 lb. p.s.i. **C. W. HOGG, 42, BUSHEY WOOD ROAD, SHEFFIELD.** Telephone: 72777.

FOR SALE

ECONOMIC BOILERS—9 ft. diam. by 12 ft. 6 in. Foster Yates, 200 lb. w.p.; 8 ft. diam. by 14 ft. Paxman. 180 lb. w.p. Twenty others, all sizes.

NEW GALVANISED PIPING. Immediate delivery. Johnson Filter **PRESSES,** 25 in., 18 Frame, practically new.

FIVE new **FURNACE RETORTS,** 8 ft. diam., 6 ft. 8 in. deep, approx. 8 tons each. Welded Steel.

FIVE Dish-ended **NAPHTHA TANKS,** 18 ft. 6 in. long by 4 ft. 4 in. diam., two having agitators.

TWO 35 ft. long by 9 ft. diam. Lead-lined **TANKS.**

Stainless Steel **FILTER TANK,** 3 ft. 6 in. diam.

ONE Stainless **CONICAL HOPPER,** 7 ft. 3 in. diam., overall depth, 7 ft. 6 in.

TWO Broadbent **WATER-DRIVEN CENTRIFUGES,** 30 in. diam., 12 in. deep, 1,150 r.p.m., 150 lb. pressure.

FOUR Papier-mache O.T. **TANKS,** 8 ft. 3 in. diam., 9 ft. deep. (Unused.)

SIX O.T. TANKS, 7 ft. diam. 14ft. deep, lined inside with acid-resisting bricks.

SIX Aluminium **CONDENSERS,** 14 ft. long by 2 ft. 6 in. diam. 386 Tubes, ⅝ in. o.d.

ONE Rectangular Lead-lined **TANK,** 8 ft. by 4 ft. 6 in. by 2 ft. 6 in.

FORTY Riveted **RECEIVERS,** 8 ft. 6 in. long, 5 ft. 6 in. diam., 75 lbs. w.p.

CAST-IRON PIPES, 5000 ft. Each 6 in. and 8 in. **NEW VALVES** in Stainless, Gunmetal, Enamel Lined.

Free Catalogue, "Watkins Machinery Record," available

FRED WATKINS, COLEFORD, GLOS.

GRAVITY Roller Conveyor several lengths, Rolls. 2¼ in. diam. by 16 in. 3 in. centres. Good condition. **THOMPSON & SON (MILLWALL), LIMITED, CUBA STREET MILLWALL E.14.** (Tel. . East 1844.)

LIMITED number of new '**STIRRER GATE**' agitators fitted with vertical moss 5 h.p., 1,000 to 20, worm reduction gears, 3½ in. diam., stainless steel drive shafts with S.S. paddle gates attached; also several new 10 h.p. Wallwork reduction gears, 9 in. centres ratio 210 by 18, vertical output shaft, can be supplied mounted on 6 ft. 6 in. by 1 ft. 10 in. C.I. bed plate if required.

WOODFIELD & TURNER, BURNLEY. Tel. 3065.

SCREENLESS PULVERIZERS for fine grinding of Chemicals. Also **CYCLONES, ROTARY VALVE FEEDERS. Callow (Engrs.) Ltd. Kirkby Trading Est., Liverpool.**

STEAM-HEATED TABLES, 72 in. by 30 in. and 58 in. by 26 in.

Aluminium **TRAYS,** 42 in. by 24 in. and 33 in. by 20 in., ⅛ in. thick.

Cast-iron Copper-lined **STEAM PAN,** 25 gal., on three legs.

Vertical Crosstube **STEAM BOILER,** 9 ft. by 4 ft., 80 lb. pressure.

KIMMINS & SONS, LTD., LYNDHURST ROAD, WORTHING

100-TON capacity Vertical, Totally Enclosed, Riveted Steel **STORAGE TANKS**—20 ft. diam. by 12 ft. high, 23,500 gallons each, ⅜ in. thick sides and bottom, ½ in. thick bolted-on top cover; fitted with stirring gear, overdriven through 3.5 h.p. flameproof motor, with reduction gear and starter; 150 r.p.m., complete with manhole, catwalks, ladders, etc. New 1942. Box No. **C.A. 3197, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

FOR SALE

3 JACKETED **INCORPORATORS**, double "Z" arms, double geared, power-driven tipping motion, with counterbalancing weights.

1—Baker Perkins **MIXER** as above, not steam jacketed, single geared, complete with 25 h.p. A.C. motor.

3—Baker Perkins and Werner Jacketed **MIXERS** screw tipping pattern, friction pulley drive, single geared, with double-fin type agitators.

4—Gardner **RAPID SIFTER MIXERS** and **MIXERS** only, various sizes, one with brass fitted interior and glass-lined end plates.

27—Various **POWDER DRESSING** or **SIFTING MACHINES**, totally enclosed with barrels from 80 in. long by 22 in. diam. to 120 in. long by 30 in. diam., belt driven with collecting worm in hopper bottoms.

1—Simon Horizontal Tubular **DRIER**, 12 ft. long, 100 lb. steam pressure, size 3B, requiring 12 b.h.p.

4—Recessed Plate **FILTER PRESSES**, 30 in. square, 70 plates in each, centre fed.

5—Johnson **FILTER PRESSES**, 24 in. square, side feed and enclosed delivery, fitted 29 plates and 30 frames.

1—Johnson **FILTER PRESS**, 36 n. square, plate and frame type, double inlet and enclosed delivery ports.

Johnson Oil **FILTER PRESS**, Premier type plates 2 ft. 8 in. by 2 ft. 8 in., of which there are 45, with angle lever closing gear.

1—Johnson **FILTER PRESS**, 42 C.I. plates, 32 in. square, centre feed.

Steam-heated **FILTER PRESS**, Premier type, 32 in. square, with 30 recessed plates.

Wood **FILTER PRESS**, fitted 69 ribbed plates, 2 ft. 8 in. square, with top centre feed and bottom enclosed delivery channel.

1—24 in. **HYDRO EXTRACTOR**, self balancing, swan-neck type, self emptying bottom.

Heavy Cake **CRUSHING MILL**, 2-pair high, by Nicholson, for cake up to 3 in. thick, rolls 30 in. long, top with coarse teeth 9 in. diam., bottom with finer teeth 12 in. diam.

5 Sets A.A. **CRUSHING ROLLS** for linseed, cotton seed, etc., 48 in. long, belt driven, with feed hopper, side frames, baseplate and striking gear.

Bennett Copper-built **EVAPORATOR**, 4 ft. diam. by 4 ft. 6 in. high, steam-jacketed bottom, mounted on legs, with swan-neck vapour pipe and separate vertical belt-driven vacuum pump.

Douglas **ROTARY PUMP** for oil, soap, etc., belt driven.

6 Various Horizontal Duplex **STEAM PUMPS**, Worthington and Tangye pattern, 1 in. to 2½ in. suction and delivery.

"U"-shaped Horizontal **MIXER**, 8 ft. long, 3 ft. wide, 3 ft. 3 in. deep, belt and gear driven, end outlet, square horizontal centre shaft with cast radial type mixing arms, last used for linoleum paste.

1—"U"-shaped **MIXER**, as above, but 7 ft. long.

4—5-roll **REFINERS**, fitted chilled iron, water-cooled rolls, 40 in. long, 16 in. diam., belt and gear driven, with clutch drive suitable for motor, by Baker Perkins, Ltd.

No. 2HS Hammamac **HAMMER MILL**, No. 1 size, Standard Miracle Mill, No. 2 size Standard Miracle Mill and a No. 3 Super Miracle Mill, with fans, piping and cyclones.

7 ft. Torrance Positive-driven **EDGE RUNNER**, 2 Vertical Paint Pug Mills, 2-bar Disc Paint Grinding Mills, and 2 Horizontal 40-gallon capacity Cox Pug Mills for paint.

1—No. 1A Water-cooled **CIRCULATOR MILL**.

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HYDRO EXTRACTORS

72-IN., 60-in. and 48-in., by **BROADBENT**, underdriven, direct coupled, 3-point suspension, steel galvanised baskets.

48-in., by **BROADBENT**, lead-lined monitor, ebonite covered basket, 3-point suspension.

48-in., by **BROADBENT**, belt driven, 3-point suspension, steel galvanised basket.

48-in. and 42-in., by **WATSON LAIDLAW**, underdriven through Vee ropes from flange-mounted vertical spindle motor; 3-point suspension, copper tinned baskets.

ALL suitable for 400/3/50 supply and complete with starters.

Smaller sizes, belt- and electric-driven, in stock.

JACKETED PANS

100g., 150g. and 200g. new Jacketed Pans, all welded, mounted on three legs; with or without mixing gear.

MIXERS

MORWARD "U"-shaped **TROUGH MIXERS** in various sizes up to 3 tons capacity with scroll- or paddle-type mixing gear: jacketed or unjacketed.

One New 100g. Glass-lined **JACKETED EVAPORATING PAN** by **PFAUDLER**, 70 lb. p.s.i. w.p. in jacket.

One Glass-lined Totally Enclosed **RECEIVER** in cast iron, 50g. capacity, with two sight glasses in top.

One 300g. **COPPER JACKETED BOILING PAN**, with stainless steel agitator, direct coupled to electric motor.

One 500g. **JACKETED AUTOCLAVE**, arranged with detachable cover, 150 lb. p.s.i. in jacket, 100 lb. internally.

WE SPECIALISE IN THE CONSTRUCTION OF ALL TYPES OF MIXING VESSELS MADE TO REQUIREMENTS.

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Various **MONO** and other **PUMPS** in stock, 2 in. to 6 in., new and second-hand, in stainless steel, gunmetal and cast iron.

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30 CWT. CHAIN BLOCKS, 10 ft.-12 ft. lift, ex-Government surplus. £15 per set.

5 CAST-IRON JACKETED PANS, 36 in. diam. by 27 in. deep, 1¼ in. bottom outlet. £20 each.

1 MILD STEEL WELDED OPEN-TOP TANK, 60 in. by 27 in. by 42 in. by ⅝ in. plate. £25.

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30 ft. by 9 ft. **CYLINDRICAL ENCLOSED**, 12,000 gallons. Ditto, 6,750, 6,000, 5,000, 4,000, 3,000, 2,000 and 1,000. Many smaller.

RECTANGULAR, Open and Enclosed **TANKS** up to 10,000 gallons.

SECTIONAL, 16,000, 8,350, 3,000, 2,000 and 1,500 gallons.

VEHICLE TANKS, 3,360, 2,500, 1,500, 1,250 and 600 gallons.

Ten Welded Dish-ended **CYLINDRICAL ENCLOSED TANKS**, 7 ft. 9 in. by 6 ft. diam. 1,250 gallons each. Fitted manhole and cover, etc.

MIXERS, BOILERS, CONDENSERS, HYDROS, STILLS, REFINERS, ETC.

Lists of Chemical Plant sent on request.

HARRY H. GARDAM & CO., LTD.,
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600

PROCESS PLANT

2 **TUBE MILLS**, each 20 ft. by 3 ft. 6 in. diam., mechanical worm feed and enclosed steel discharge box. Pulley drive.

3 Micro twin **REFINING MILLS** by Torrance, rolls 14 in. by 9 in. by 7 in. Drive from f. and l. pulleys.

Horizontal single trough **JACKETED MIXER** by Day. Trough 7 ft. by 38 in. by 42 in. deep. Intermittent spiral Agitators on 3½ in. diam. glanded shaft. Driven through 'V' ropes and duplex chain by 7½ h.p. Slipring motor 400/3/50.

Horizontal **DOUBLE TROUGH MIXER** with M.S. Welded Trough 40 in. sq. by 36 in. deep. Z-type Agitators, double geared, motorised 400/3/50. Power op. tilting.

ROTARY VACUUM FILTER by Davey Paxman. Drum 33 in. by 36 in. diam., with stepped perfs. f. and l. pulley drive through spur and worm gear.

2 Recessed Plate type **FILTER PRESSES** by Manlove Alliott, with 54 plates 36 in. sq. by 1 in. thick. Hand op. closing gear.

Two 40 galls. **KELLIE** copper S.J. tilting **BOILING PANS**, 30 in. diam. by 26 in. deep. C.I. jacket for pressure 80 lb. sq. in. Hand tilting.

Two 4-cyl. **AMMONIA COMPRESSORS** by L. Sterne. Type 4 W.7. Each designed to develop 41 tons refrigeration at 410 r.p.m. Complete with Condenser Oil Separator, Liquid Receiver and Centrif. Pump. 'V' rope drive.

New ½ h.p. Slow Speed Stirrers 440/3/50, totally enclosed motor, stainless steel shaft with propellers rotating at 420 r.p.m.

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INDUSTRIAL BY-PRODUCTS, LTD., 16, Philpot Lane, London, E.C.3, will be pleased to receive particulars of any by-products, waste materials and residues for disposal.

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THE proprietors of British patent No. 648887 are prepared to sell the patent or to license British Manufacturers to work thereunder. It relates to **A FLOAT BALANCE FOR MEASURING WEIGHTS OR FORCES.** Address: **BOULT, WADE & TENNANT, 112, HATTON GARDEN, LONDON, E.C.1.**

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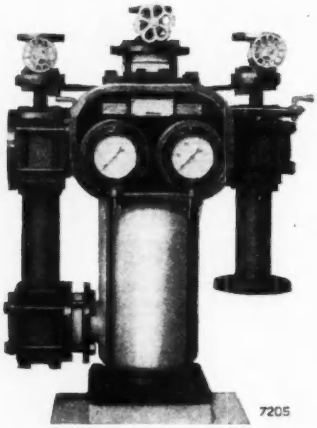

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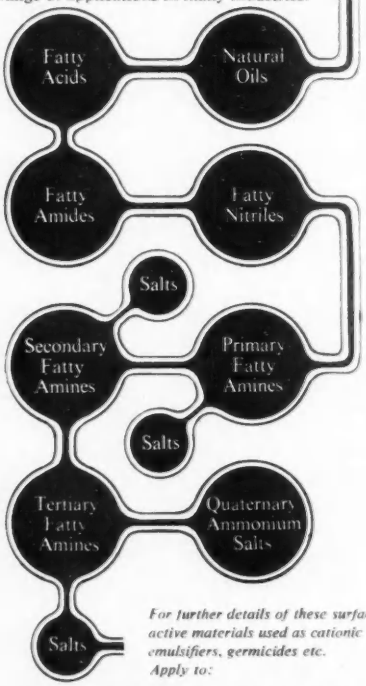

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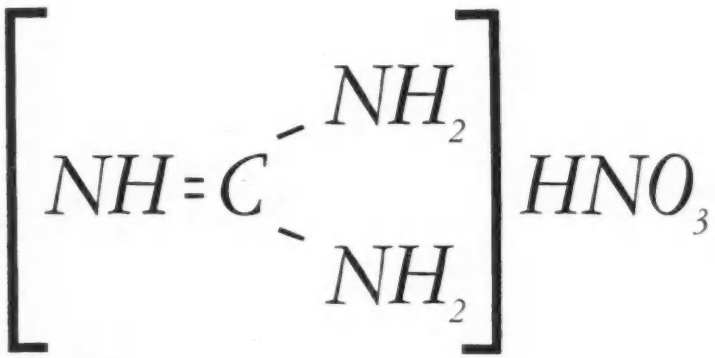

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